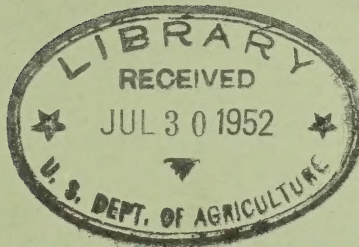
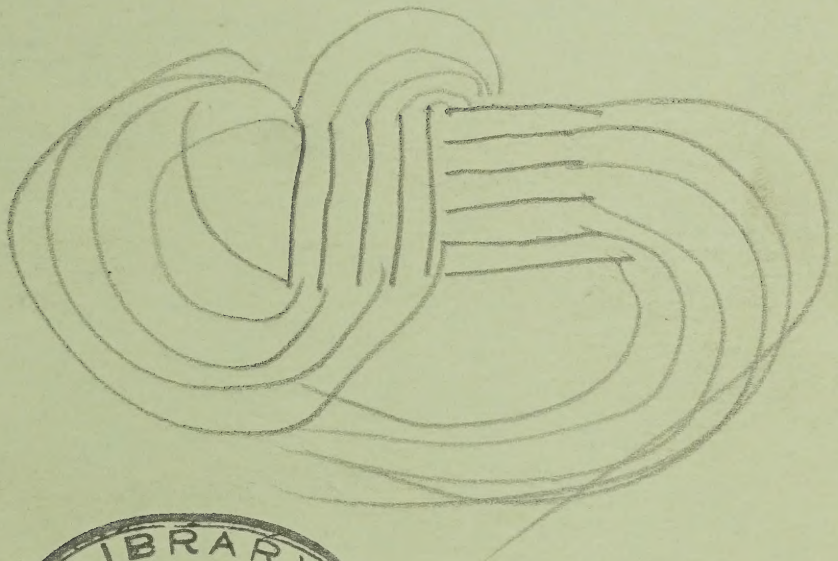


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AN ANALYSIS OF HOUSEHOLD PURCHASES OF CITRUS PRODUCTS

BY 500 URBAN FAMILIES,

November 1948-October 1949



UNITED STATES DEPARTMENT OF AGRICULTURE
✓ Bureau of Agricultural Economics

Washington, D. C.

December 1951

DEPARTMENT OF VEGETABLES DIVISION OF VEGETABLES CONTENTS

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AN ANALYSIS OF HOUSEHOLD PURCHASES OF CITRUS PRODUCTS
BY 500 URBAN FAMILIES, November 1948-October 1949

By Kenneth E. Ogren, Agricultural Economist 1/

826981

INTRODUCTION

Production of citrus fruit in the United States has expanded rapidly over the last several decades, and a continued large increase in production is forecast for the next few years. Many of the present groves have not reached the maximum bearing age and citrus plantings in recent years have exceeded replacement needs. This is particularly true of orange trees in Florida. Future expansion in production will probably take place at a faster rate than increases in population and in citrus exports. An increased demand for citrus products, therefore, will be necessary if satisfactory returns to growers are to be maintained.

Per capita consumption of citrus fruit has increased substantially during the last 30 years. Up to 1930, all of the increase came through larger use of fresh fruit. During the 1930's, there was a large increase in consumption of processed grapefruit while per capita consumption of fresh fruit remained relatively constant. The increased production of oranges during the 1930's, however, was accompanied by increases in per capita use of fresh oranges. During and immediately following World War II, the marketing of a larger orange crop was reflected in rapid gains in consumption of canned single-strength juice. Since 1948, a substantial portion of the orange crop has been marketed in the form of frozen concentrated orange juice. Per capita use of fresh oranges, in fact, has declined considerably from the peak reached during World War II.

The proportion of all citrus fruits marketed in processed form has increased sharply during the last 10 years. During the 1949-50 season, almost one-half of the total United States citrus crop was utilized in processed products, compared with less than one-fourth in the 1939-40 season. Two developments have contributed to this shift from fresh to processed products -- the rapid expansion in production of canned citrus juices, especially orange juice, during World War II and the amazing growth of frozen concentrated orange juice since 1948.

The total pack of canned single-strength citrus juices increased almost fourfold during the war. More than 60 million cases were packed in the 1945-46 season, compared with about 16 million cases in 1939-40. In addition, large quantities of unfrozen or "hot-pack" citrus juices were packed for military and lend-lease requirements.

Since 1948, frozen concentrated orange juice has greatly accentuated the shift to processed citrus products. During the 1947-48 season, about 2.5 million gallons of frozen concentrated orange juice were manufactured. Production increased to 12 million gallons in 1948-49, to 25 million gallons in 1949-50, and to an estimated 35 million gallons in 1950-51.

1/ The research on which this report is based was made possible by funds provided by the Research and Marketing Act of 1946. This study was conducted under the Research Intern Program of the U. S. Department of Agriculture through a cooperative agreement between the Department and the University of Minnesota.

About 60 percent of the Florida orange crop in the 1949-50 season was processed in canned or frozen form. Slightly more than half of all oranges processed in Florida during 1949-50 went into the manufacture of frozen concentrates. A large proportion of the California orange crop is still marketed as fresh fruit. Less than 15 percent of the total production of frozen concentrated orange juice has been processed from California oranges. Costs of production are usually higher in California than in Florida, but California growers have traditionally received the highest prices in the fresh-orange market. The rapid development of frozen concentrated juices, consequently, has affected each producing area differently.

PURPOSE OF STUDY

The major problem facing the citrus industry at present is the development of a market for an expanded production of citrus fruit that will assure a reasonable return to citrus growers. The effect of frozen concentrated citrus juices in enlarging the over-all demand for citrus products is an important factor in this problem.

The primary objective of this study was an analysis of the characteristics of consumer buying of frozen concentrated orange juice to ascertain whether this product has increased and will further increase the demand for all citrus. For this study, chronological listings of individual family purchases of citrus products and competing canned juices during a 1-year period were obtained from consumer-panel diaries for a sample of 500 urban families. These diaries contained a record of citrus purchases reported by individual families which could be related to the income and other characteristics of the purchaser.

Other objectives of this study included an analysis of the effect of income on purchasing of citrus products and the relationship of other family characteristics and place of residence to variations in purchases of citrus. Variations between individual families in frequency and volume of purchases for all citrus as well as individual citrus products were also studied. Consumer reactions to intraseasonal price changes and competition between various citrus products and other canned juices were analyzed, although the period covered in these data was not long enough to permit positive conclusions.

This study had a methodological objective in that it was in part exploratory in the use of consumer-panel data to determine the usefulness and applicability of consumer-panel purchase data in studying consumer demand for citrus products.

SUMMARY OF MAJOR FINDINGS

Proportion of Families Buying Citrus Products.-- Practically all the 500 sample families made at least one purchase of a citrus product during the year, November 1948-October 1949. As some citrus is consumed by most families, higher per capita consumption of citrus products must come through increased consumption among present consumers.

A larger proportion of the 500 urban householders bought each of the fresh fruits -- oranges, grapefruit, and lemons -- than any of the canned citrus juices. More than 90 percent bought oranges at least once compared

with less than 60 percent that bought canned orange juice at least once. The proportion of families buying two of the noncitrus canned juices, tomato and pineapple, exceeded that for any of the citrus juices.

Variation in Family Expenditures on Citrus Products.-- Expenditures on all citrus products for household use during the 1-year period averaged \$16.84 per family, only about 32 cents per week. About two-thirds of the total expenditures for citrus were for fresh citrus fruits, with an average of \$7.46 for oranges. Before World War II, however, householders bought practically all of their citrus in fresh form.

Citrus expenditures varied widely between individual families -- from more than \$80 by one family to less than \$1 by 19 families. Because of the skewed nature of the frequency distribution, the median family expenditure of \$13.85 was considerably below the average figure.

One-fourth of the sample families accounted for more than one-half of the total citrus expenditures of all 500 households. Only 5 percent of total expenditures, however, were made by the 125 families in the lowest expenditure quartile.

Although a large percentage of the sample families bought each of the citrus products at some time during the 1-year period, a relatively small percentage of the buying families made most of the purchases. Ten percent of the sample families buying each of the citrus products listed below accounted for the following proportions of the total volume of purchases of these products: 2/

<u>Item</u>	<u>Percent</u>
Canned orange juice	50
Canned orange-grapefruit blended juice ..	48
Canned grapefruit juice	46
Fresh lemons	43
Fresh grapefruit	36
Fresh oranges	35

Frequency of Purchase.-- The proportion of families buying each of the citrus products during any single month was much lower than the proportion buying during the 1-year period, especially for canned citrus juices. About 60 percent of the families buying each of the canned juices made purchases during only 1, 2, or 3 months. Of the families buying fresh oranges, about 60 percent bought during more than 6 months, with 17 percent buying in all 12 months. Fresh grapefruit and lemons were bought with greater frequency than the canned citrus juices, but not as frequently as fresh oranges.

Who Bought Frozen Concentrated Orange Juice.-- During the 1-year period, 44 percent of the sample families bought frozen concentrated orange juice. The proportion buying each month varied from 2 percent in November 1948 to 22 percent in October 1949, reflecting the upward trend in purchases throughout that marketing season.

The market for frozen concentrated orange juice was more heavily concentrated among higher income families than for any other citrus product. The proportion of families buying ranged from 29 percent of the lowest income

2/ Frozen concentrated orange juice was not included because most of the families made their first purchase of this product during the latter half of the 1-year period.

group to 60 percent of the highest income group. The average volume per buying family in the highest income group was almost three times larger than in the lowest income group.

A slightly larger percentage of families with children bought frozen concentrated orange juice than did the families without children. Among families with six or more members, however, a smaller proportion bought the product than in any other family-size group. The average volume of purchases by families with three or four members was more than double the average volume purchased by families with more than four members, but canned orange juice purchases were highest among those families with more than four members. Lower prices for equivalent quantities of the canned juice may have been a more influential factor with these larger sized families.

Fifty-eight percent of the northeastern families bought concentrated orange juice compared with 44 percent in the North Central States and an average of 25 percent in all other regions. In addition, average volume of purchases per buying family was more than 60 percent larger in the Northeast than in any of the other regions. Families living in the large metropolitan areas were the most frequent purchasers of the frozen juice. Volume of purchases per family averaged about 70 percent higher among those living in metropolitan areas of more than 1 million population than for families living in cities of population from 10,000 to 100,000.

In general, families buying frozen concentrated orange juice were those with relatively large purchases of other citrus products.

"Repeat" Purchasing of Frozen Concentrated Orange Juice.-- Less than half of the buying families became steady purchasers of the product during the 1-year period. About 46 percent made only a few trial purchases and then stopped buying the product, while an additional 12 percent bought during a few months of the year but not regularly.

Purchase Patterns of Families Buying Frozen Concentrated Orange Juice "Regularly."-- Seventy-two sample families bought frozen concentrated orange juice in practically every month following their initial purchase. These families accounted for the major portion of total purchases of this product. Fresh oranges were bought by almost all of these families at some time during the 1-year period. More than half of these families, however, discontinued their purchases of fresh oranges after buying frozen orange juice; this indicated substitution of the frozen juice for freshly squeezed orange juice. In addition, about half of the families that bought both frozen and canned orange juice some time during the 1-year period stopped buying the canned product after beginning to buy frozen juice.

These data indicated that purchases of frozen concentrated orange juice resulted in decreased buying of other orange products. But increased volume of purchases of the frozen product more than offset declines in purchases of fresh oranges and canned single-strength orange juice. Total purchases of oranges and orange products by the 72 families increased more than one-fourth from the first quarter to the fourth quarter of the 1-year period, whereas purchases made by the remaining families in the sample decreased by one-third.

From the purchase patterns of those sample families buying frozen concentrated orange juice regularly, it is evident that purchases of oranges and orange products will increase substantially during the summer when the market

supply of fresh oranges reaches a seasonal low. This increase in summer purchases will represent a net increase in the total consumer demand for oranges.

The purchasing pattern for other canned juices -- grapefruit, blended orange-grapefruit, tomato, and pineapple -- indicated that increased purchases of frozen concentrated orange juice by these 72 families did not appreciably reduce their buying of these other canned juices.

Citrus Purchases by Income Groups.-- The average family expenditure increased with each higher family income group. The expenditures by families with incomes of \$7,000 and over were almost double the purchases of those with incomes of under \$3,000. In the range between \$3,000 and \$7,000, however, there were only small differences in average expenditures between income groups.

Average volume of purchases of each citrus product were larger in the high income groups than in the lowest income group, but differences were substantially greater for fresh citrus fruits and frozen concentrated orange juice than for the canned juices.

Citrus Purchases by Other Family Characteristic Groups.-- A larger proportion of the families with children than those without children bought citrus products. Canned grapefruit juice was the only product bought by a larger proportion of nonchildren families. 3/ For each citrus product, average expenditures per family were highest among families with children but, on a per capita basis, expenditures of the families without children averaged higher for each product except canned orange juice.

The larger families had the higher average expenditures per family on citrus products but the average expenditure did not increase appreciably after the size of the family reached four. The small families had a slightly lower average family income but on a per capita basis the income of the smallest families (less than three) was almost three times that of the largest families (six and over).

Average citrus expenditures were highest among families with college education and lowest among those with only grammar school education. As for occupational status, a large proportion of the professional-executive group was among the largest buyers of citrus products but no relationship was observed among the other occupational groups. Purchases of citrus products by these 500 sample families apparently were not associated with age of family head.

Citrus Purchases by Place of Residence.-- Variations between regions in citrus expenditures were almost as large as the differences between income groups. The average expenditures of sample families living in the Northeast were higher than in any other region and almost double those of the families in the Pacific and Mountain-Southwest States. Average expenditures by the northeastern families were largest for each citrus product except fresh lemons and canned single-strength orange juice.

The sample families living in metropolitan areas of more than 1 million population had the largest average expenditures for citrus products -- more than 40 percent higher than those of families living in cities of less than

3/ For definition of families without children, see page 9.

100,000 population. The differences in average citrus expenditures between various size-of-city groups, however, were not so large as in the family income and geographic area comparisons.

PROCEDURE

Description of Primary Data.--- Individual purchase records for 500 urban families constituted the primary data used in this study. These records contained the chronological listing of all purchases of citrus products and other canned juices by each of these families during the 1-year period, November 1948-October 1949. These 500 urban families were a subsample for the National Consumer Panel of Industrial Surveys Company, Inc., Chicago, Ill. 4/

A purchase card was obtained for each of the 500 families which listed all of the family's purchases of fresh citrus fruits, canned citrus juices, and all other juices during the 1-year period. The following products were listed separately on this card: Fresh oranges (by State of origin), fresh grapefruit, fresh lemons, frozen concentrated orange juice, all canned or bottled single-strength fruit and vegetable juices.

The following information was given for each purchase:

- a. Fresh fruit
 1. Date of purchase (month and day)
 2. Number of units
 3. Total cost
 4. Size of fruit (small, medium, or large)
- b. Processed fruit
 1. Date of purchase (month and day)
 2. Number of cans (or bottles)
 3. Size of can (number of ounces)
 4. Total cost of purchase
 5. Total number of ounces in purchase

For each family, detailed information was also provided on place of residence, family income, and several other family characteristics. (For detailed listing, see Appendix, pp. 43-44.

4/ Industrial Surveys Company maintains a National Consumer Panel of about 4,500 households. Beginning with October 1949, purchase data for fresh citrus fruits, canned juices, frozen concentrated juices, and dried fruits have been collected by that company under contract with the U. S. Dept. of Agr. This program has been financed cooperatively by the participating fruit industry groups and the Department. The following series of publications have been issued jointly by BAE and the Fruit and Vegetable Branch of PMA: Consumer Purchases of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits (monthly, beginning Jan. 1950), Consumer Fruit and Juice Purchases by Regions and Type of Retail Outlet (quarterly, beginning Jan.-Mar. 1950), and Consumer Buying Practices for Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits, Related to Family Characteristics, Region, and City Size (Oct. 1949-Mar. 1950 and Apr.-Sept. 1950).

Composition of the 500-Family Sample.--- The subsample of 500 families was selected at random from the Industrial Surveys Company families living in cities of 10,000 population and over. Families that were not continuous panel members during the 1-year period were excluded from the sample. The sample was restricted to urban families for several reasons. One of the major objectives of this study was an analysis of the household buying of frozen concentrated orange juice. During this selected year, a much larger proportion of stores in cities of over 10,000 stocked this product than stores in smaller towns and rural areas. 5/ Other studies also have indicated that urban households buy considerably more of some citrus products than do rural households. It was thought, therefore, that restricting the sample to urban households would maximize the amount of purchase data for a sample of 500 families and decrease the variability in purchases between families.

Geographically, the 500 sample families were concentrated in the Northeast and North Central States. Almost 39 percent of the families lived in the Northeast and 33 percent in the North Central States. The remaining 28 percent of the families were distributed among the other three regions -- South, Mountain-Southwest, and Pacific. 6/ Compared with the distribution of all United States households, rural and urban, a larger proportion of these sample families were in the Northeast because this region is predominantly urban. A smaller proportion of these families were in the South because of the rural nature of that region.

Some of the characteristics of these 500 sample families were compared with the estimates for all urban households obtained from population surveys conducted by the Bureau of the Census. The proportion of high-income families among the 500-family sample was approximately equal to that for all urban households (table 1). The proportion of sample families in the two lowest income groups (under \$3,000) was considerably smaller, whereas a larger proportion was in the two middle-income groups (\$3,000 up to \$5,000). The median size of family for the sample families was slightly larger for each income group except the lowest income group, under \$2,000. That income group had a lower median family size because many of the sample households in that income classification consisted of only one person. The Bureau of the Census definition, however, requires that a family consist of at least two persons.

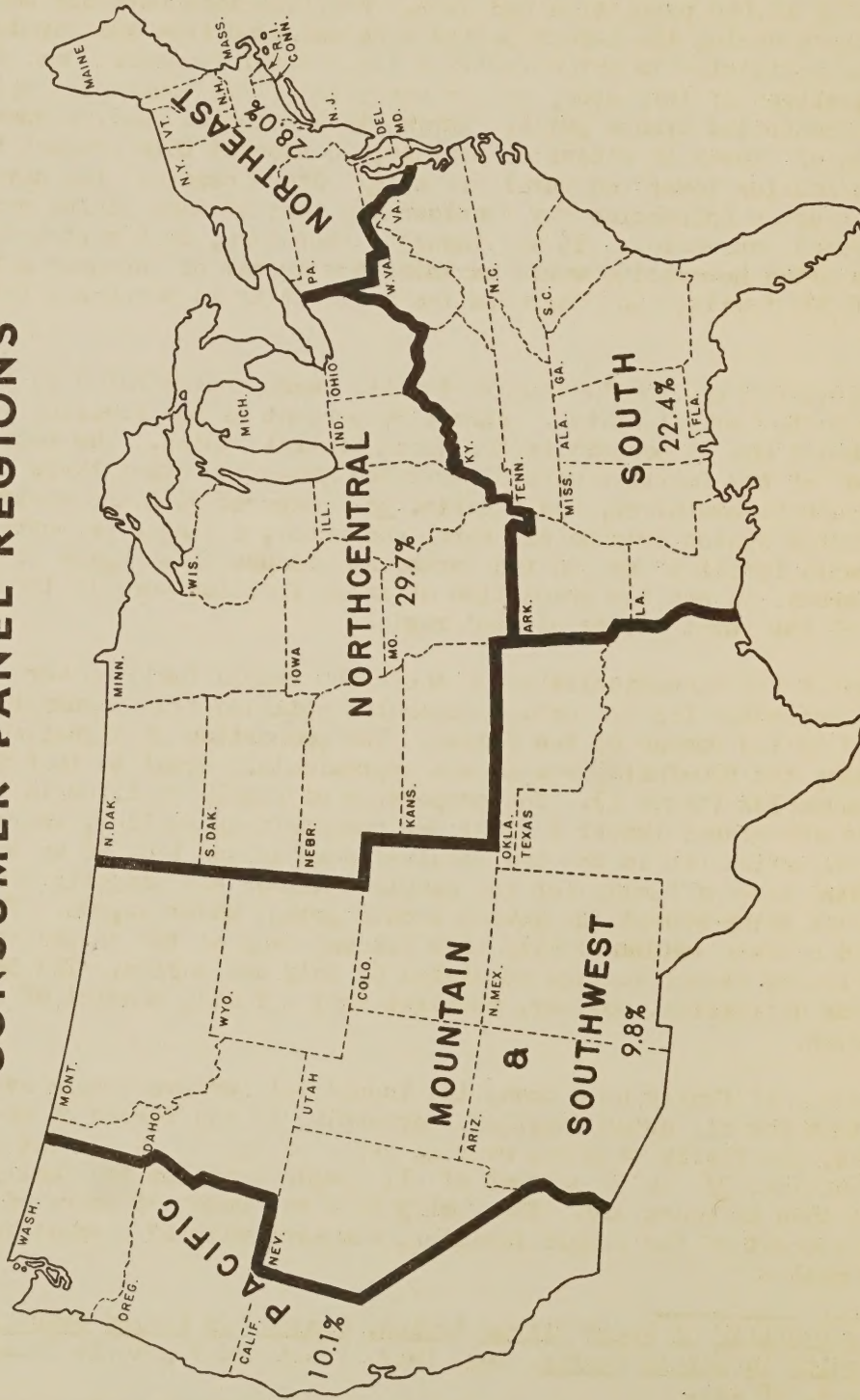
The age of family head among the Industrial Surveys sample averaged higher than for all urban families. According to the Bureau of the Census estimates, the family head was over 44 years of age in 49 percent of all urban families. 7/ In 56 percent of all sample families the family head was more than 44 years old. The family head was under 35 years of age in only 16 percent of the sample families, compared with 27 percent for all urban families.

5/ Availability of Fresh Citrus Fruits, Canned and Frozen Juices, and Dried Fruits in Retail Stores, Aug. 1949, Fruit and Vegetable Branch, PMA, U. S. Dept. of Agr.

6/ These geographical regions refer to the Industrial Surveys Company areas, which are slightly different from the U. S. Bur. of the Census regions (fig. 1).

7/ Bur. of the Census, Current Population Reports: Consumer Income, Series P-60, No. 6, "Income of Families and Persons in the United States, 1948," p. 18.

U. S. POPULATION DISTRIBUTION BY NATIONAL CONSUMER PANEL REGIONS



U. S. DEPARTMENT OF AGRICULTURE

BAE 48309

Figure 1

Table 1.- Distribution of 500-family sample and all United States urban households by total income and size of family ^{1/}

Family income (dollars)	Income distribution		Median size of family	
	Industrial :		Industrial :	
	Surveys :	All urban	Surveys :	All urban
	Company :	families	Company :	families
	500-family :	<u>2/</u>	500-family :	<u>2/</u>
	sample :		sample :	
	Percent	Percent	Number	Number
Under 2,000	9.6	17.1	1.7	2.5
2,000 - 2,999 ...	15.2	19.4	3.1	3.0
3,000 - 3,999 ...	28.0	22.8	3.4	3.2
4,000 - 4,999 ...	20.0	15.3	3.3	3.2
5,000 - 5,999 ...	11.6	9.9	3.5	3.3
6,000 and over ...	15.6	15.5	3.8	3.8

^{1/} The 500-family sample includes households in cities of 10,000 population and over. The Bur. of the Census estimates refer to households in cities of 2,500 population and over.

^{2/} Bur. of the Census, Current Population Reports: Consumer Income, Series P-60, No. 6, "Income of Families and Persons in the United States, 1948," p. 17.

The proportion of families with children was slightly higher for the 500-family sample -- 58 percent, compared with 53 percent for all urban families. ^{8/} The actual difference between these two groups was less than indicated because the figure of the Industrial Surveys Company included all children up to 20 years of age while the Bureau of the Census counted only children under 18 years of age.

The educational level of the families in the consumer panel of Industrial Surveys Company was above that for the total population. According to a report made by that company in 1949 on the composition of the total sample in the National Consumer Panel, 19 percent of the heads of families in the panel had some college education compared with 13 percent for all United States households. ^{9/} Almost 48 percent had no education above grammar school, but 52 percent of the family heads in all United States households were in this educational group. The educational level of the 500-family sample was slightly higher than that of all families because the sample included only urban families.

Thus, the major difference observed between the composition of the 500-family sample and the total population was in age of the family head, with smaller variations in income and educational level. Because all of these factors were somewhat intercorrelated in the 500-family sample, a change in one of these factors would probably be associated with changes in the other factors.

^{8/} See footnote 7, p. 7. (See p. 19.)

^{9/} This comparison was included in a National Consumer Panel Report to the U. S. Dept. of Agr. on citrus fruits, canned juices, and frozen and concentrated juices for third quarter, 1949, from Industrial Surveys Co. (unpublished data).

Analysis of Data.--- Processing and tabulating the large number of individual family purchases was the first step in the analysis of these purchase data. Many of the purchase cards for individual families listed more than 200 separate purchases during the 1-year period. Most of the data on purchases and on family characteristics were transferred to IBM cards in order to facilitate the analysis.

The products that were coded were reduced to the following 13 products or product groupings: 10/

- | | |
|-------------------------------------|---|
| 1. California oranges | 8. Canned grapefruit juice |
| 2. Florida oranges | 9. Canned blended orange-grapefruit juice |
| 3. Unidentified oranges | 10. Canned lemon juice |
| 4. Grapefruit | 11. Canned pineapple juice |
| 5. Lemons | 12. Canned tomato juice |
| 6. Frozen concentrated orange juice | 13. Other canned juices |
| 7. Canned orange juice | |

For each of these commodity groupings, the total volume and cost of monthly purchases for each family were coded instead of each individual purchase, because the size of this sample was not large enough to warrant an analysis of purchase patterns for a period of less than a month. This reduced the total number of purchase entries and simplified the coding because the family purchase cards obtained from Industrial Surveys Company listed monthly subtotals for all of the individual products. The volume and cost of all purchases during the year and the number of months in which purchases were made were punched into a yearly purchase summary card.

Thus, monthly and yearly purchase data could be sorted and tabulated mechanically according to each of the family characteristic classifications. From these tabulations it was possible to learn for each classification -- for example, family income -- and for each product or group of products the following information:

1. The proportion of families buying in each income group
2. The average price paid by each income group
3. The average volume of purchases per family in each income group
4. The average volume of purchases per buying family in each income group
5. The average expenditure per family in each income group
6. The average expenditure per buying family in each income group

The analysis of these purchase data involved hand tabulations as well as the mechanical tabulations obtained from IBM machines. Mechanical tabulation methods were not readily adaptable for the study of purchasing patterns of individual families, variability in purchases between individual families, and the shifts in purchasing of different products resulting from short-run price changes and the introduction of frozen concentrated orange juice.

In the analysis of these data a study was made of the yearly expenditures on all citrus products by these 500 families. A frequency distribution of these expenditures was constructed which depicted the range and variability in total citrus expenditures. The families were divided into quartiles according to total citrus expenditures and per capita citrus expenditures. The

10/ Texas oranges were combined with unidentified oranges and many of the canned juices were combined into a single group (other canned juices) because of the small incidence of their purchase.

families in each quartile were sorted by income, other family characteristics, and place of residence, in order to learn the association between these factors and citrus expenditures.

The relationship of these factors to citrus purchases was analyzed in more detail for individual citrus products. In addition to yearly expenditures, the variation in proportion of families buying, volume of purchases, and average prices paid were examined for the various citrus products. Major emphasis was placed on a study of the relationship of income to citrus buying. The influence of family composition on selection of proper criteria in regard to income was examined. Average expenditures and volume of purchases were computed for both family income and per capita income groups.

The purchase data for the 500 families were coded so that monthly series for volume and prices could be obtained for each product. The monthly variations in consumer buying of citrus products were related to price changes. These shifts in prices and volume were correlated within income groups to learn what the effect of income levels was on response to price changes. These monthly price and volume data were used in studying the competitive relationships between the different citrus products and noncitrus canned juices.

Characteristics of household buying of frozen concentrated orange juice were investigated. At the beginning of this 1-year period, household purchases of frozen concentrated orange juice were very small but purchases increased rapidly throughout the period. In order to study the effects of this increased buying of frozen orange juice on other citrus products, purchases by two groups of families -- "regular" buyers of frozen concentrated orange juice and all other families -- were compared by 3-month periods. The classification of families as "regular" buyers was determined by an inspection of the purchase patterns of each family during the year. In this study special attention was focused on buying of fresh oranges and canned orange juice by these "regular" buyers of frozen concentrated juice in order to predict the future pattern for marketing of oranges.

An important phase of the analysis of these purchase data was a study of the patterns of citrus purchases by families and the variability observed between individual families. The study of this variability and its effects on conclusions about the nature of consumer demand for citrus products were integrated with the other findings.

THE MARKET FOR CITRUS PRODUCTS AMONG HOUSEHOLD CONSUMERS

Percentage of Families Buying

Practically all of the 500 panel families made at least one purchase of citrus products during the 1 year covered in the data, November 1948 to October 1949. 11/ Only three of these panel families purchased no citrus products.

11/ Citrus products included in these purchase data were oranges, grapefruit, lemons, frozen concentrated orange juice, canned orange juice, canned grapefruit juice, canned blended orange-grapefruit juice, lemon juice, canned tangerine juice, and other canned citrus juices. Household purchases of the citrus products excluded -- tangerines, limes, canned orange and grapefruit sections, frozen concentrated citrus juices (other than orange) -- were relatively minor during this period.

The proportion of sample families purchasing the various citrus products during the 1-year period, November 1948-October 1949, were:

<u>Item</u>	<u>Percent</u>
Fresh oranges	92
Fresh lemons	83
Fresh grapefruit	79
Canned orange juice	58
Canned grapefruit juice	53
Canned blended orange-grapefruit juice	47
Frozen concentrated orange juice	44
Canned or bottled lemon juice	23

A larger proportion of these urban householders bought each of the fresh citrus fruits than the various processed products. More families bought fresh oranges than any other citrus product. Only 39 families did not make at least one purchase of oranges during the year. Among the processed products, canned single-strength orange juice was bought by the largest number of households.

These purchase records indicated that there is a very wide market for citrus fruit, as citrus products are consumed in almost all urban households. Other studies have indicated that a large majority of families living on farms and in small towns also buy citrus products, although the market for some citrus products is less widespread among rural households than among urban households.

As some citrus is consumed by most families, a rise in average per capita consumption of citrus products must come through increased consumption among present consumers rather than in finding new customers. Individual products, particularly the frozen concentrated citrus juices, probably can expand consumption greatly through new buyers.

Frequency of Purchase

The proportion of families buying a citrus product was not a reliable indicator of the "effective" market for that product because of the variability in frequency and volume of purchases. Although a large proportion of all families bought the various citrus products, a much smaller percentage made purchases during any one month. A relatively small proportion of the sample families bought any citrus product regularly throughout the 1-year period. The pattern of the frequency of purchases among families buying six citrus products is illustrated in table 2. ^{12/} The proportion of families buying during the period measured more accurately the effective market for fresh oranges than for any of the other products. Oranges were the only product which was bought by a large number of families during a majority of the 12 months.

Almost 60 percent of the sample families buying oranges made purchases during more than 6 months of the year. Seventeen percent bought oranges during all 12 months. A considerable number of families, however, bought oranges only during 1 or 2 months of the year.

^{12/} Frequency of purchase of frozen concentrated orange juice is discussed later in this report. It has not been included in this table because most of the families made their first purchase of this product during the latter half of the 1-year period.

Table 2.- Distribution of 500 sample families according to frequency of purchases of citrus products (excluding frozen concentrated orange juice) November 1948-October 1949 ^{1/}

Item	Fresh oranges	Fresh grapefruit	Fresh lemons	Canned orange juice	Canned grapefruit juice	Canned orange-grapefruit blended juice
	Percent	Percent	Percent	Percent	Percent	Percent
Number of months of purchases -						
1 - 3	19	43	40	58	64	64
4 - 6	23	32	30	20	22	23
7 - 9	23	22	18	14	9	8
10 - 12	35	3	12	8	5	5
Total	100	100	100	100	100	100
	Number	Number	Number	Number	Number	Number
Families buying citrus products.	461	394	413	292	263	233

^{1/} Percentages based on number of families buying each product.

Almost 60 percent of all families made at least one purchase of canned single-strength orange juice during the year. The proportion of families buying canned orange juice in any single month, however, averaged about 20 percent. Only 22 percent of these buying families made purchases of canned orange juice during more than 6 months, with almost no families buying during all 12 months. Almost 60 percent of these families made purchases during 3 months or less (table 2). Twenty-six percent bought during only 1 month.

Although the frequency-of-purchase pattern for canned grapefruit juice and blended juice was similar to that observed for canned orange juice, the proportion of "regular" buyers of these products was slightly smaller. For example, more than 30 percent of the families that bought these products made purchases during only 1 month of the 1-year period.

Fresh grapefruit and lemons were bought with greater frequency than the canned citrus juices, but less frequently than fresh oranges. Purchases of grapefruit and lemons normally have greater seasonal variations than oranges do because of peaks and lows in availability and seasonality in consumer demand. The proportion of families with purchases in 1 month only was fairly high among these two products.

Fresh fruit may be bought more frequently than canned single-strength citrus juices because the canned products can be stocked on the housewife's shelves for a longer period. An examination of purchase cards revealed that very few families bought more than one or two 46-ounce cans of juice at each purchase.

Expenditures on Citrus Products

Fresh citrus fruits accounted for the largest share (about two-thirds) of total household expenditures on citrus products by these 500 sample families (table 3). Fresh oranges ranked above any other product by a wide margin. The average family expenditure for fresh oranges was \$7.46 during the 1-year period, about 44 percent of the total average family expenditure on citrus products. But it should be noted that before World War II practically all of the citrus products were bought by household consumers in the fresh form.

The differences between fresh citrus and processed citrus products are narrowed if average expenditures per buying family are used instead of all families (table 3). The average expenditure per family that bought frozen concentrated orange juice was \$3.26, second only to fresh oranges, \$8.10. The large expenditures for frozen concentrated orange juice were especially significant because of the newness of this product during the fall and winter of 1948-49. Many of the buying families did not make any purchases until late summer of 1949. Purchases of frozen concentrated orange juice in the second half of the 1-year period were almost four times as large as those in the first half.

Although practically all families bought some citrus products, a large proportion of these families spent relatively little money on citrus. Many households made only sporadic purchases of citrus products throughout the year.

Table 3.- All citrus products: Average expenditures per family, November 1948-October 1949

Product	: Proportion : Average : Average		
	: of total : family : expenditure		
	: citrus : expenditure: per buying		
	: expenditures: 1/ : family		
	: Percent	Dollars	Dollars
Oranges	44.3	7.46	8.10
Grapefruit	13.6	2.30	2.92
Lemons	8.8	1.48	1.79
All fresh citrus	66.7	11.24	11.49
Canned orange juice	10.5	1.77	3.02
Frozen concentrated orange juice ...	8.5	1.43	3.26
Canned grapefruit juice	5.9	.99	1.88
Canned blended orange-grapefruit juice	5.8	.98	2.10
Canned and bottled lemon juice	1.2	.20	.86
Other canned citrus juices	1.4	.23	2/
All processed products	33.3	5.60	6.25
All citrus products	100.0	16.84	16.94

1/ The average family expenditure was obtained by dividing the total expenditure by the total number of families, 500.

2/ Not ascertained.

Frequency Distribution of Family Expenditures.-- The distribution of the 500 sample families according to total expenditures on citrus products during the 1-year period was:

<u>Dollars</u>	<u>Number of families</u>
Less than 5.00	96
5.00 - 9.99	86
10.00 - 14.99	90
15.00 - 19.99	68
20.00 - 24.99	46
25.00 - 29.99	31
30.00 - 34.99	25
35.00 - 39.99	26
40.00 - 49.99	22
50.00 - 59.99	5
60.00 - 69.99	4
70.00 - 79.99	0
80.00 - 89.99	<u>1</u>
Total	500

The average family expenditure on all citrus products during the 1-year period was \$16.84, about 32 cents a week. There was an extremely wide variation around this average expenditure. Family expenditures ranged from a high of \$82.73 to a yearly expenditure on all citrus of less than \$1 by 19 families. There was no apparent grouping of families around an average value. The largest number of families was in the lowest expenditure group, less than \$5. Almost as many families were in each of the next two groups, \$5 to \$9.99 and \$10 to \$14.99, with a smaller number of families in the remaining expenditure groups. Because of the skewed nature of the frequency distribution, the median family expenditure of \$13.85 was considerably below the average family expenditure of \$16.84.

Quartile Distribution of Citrus Expenditures.-- The 500 panel families were divided into quartiles according to the total family expenditure on all citrus products during the 1-year period. The following class intervals for each of the quartiles resulted:

First quartile	0 - \$ 6.80
Second quartile	\$ 6.81 - 13.84
Third quartile	13.85 - 23.69
Fourth quartile	23.70 - 82.73

One-fourth of the panel families accounted for more than one-half of the total citrus expenditures of all 500 households. The 125 panel families in the fourth quartile averaged about \$36 in yearly expenditures on citrus products, and accounted for 53 percent of all citrus expenditures. On the other hand, the families in the first quartile bought only 5 percent of the total citrus purchased. If the expenditures of all 500 families averaged as high as those in the fourth quartile, total citrus expenditures would have more than doubled.

Variation in Purchases of Individual Citrus Products.-- The study of the family purchases of individual citrus products (excluding frozen

concentrated orange juice) ^{13/} revealed an even greater degree of concentration among a few families. A small number of families accounted for a large proportion of the total purchases of each of the citrus products. For example, less than 6 percent of the 500 families (29 families) bought more than half of the total canned orange juice purchased. During the year, 292 families bought canned orange juice. Their purchases totaled 302 cases (equivalent No. 2 cans). About 10 percent of these buying families (29) bought more than 2.5 cases each during the year. Their purchases totaled 152 cases. The average volume of purchases for these 29 families was 5.2 cases compared with an average of 0.6 case for all other buying families.

For canned grapefruit juice, canned orange-grapefruit blended juice, and the three fresh citrus fruits, the highest 10 percent of the buying families according to total purchases were also separated from the other buying families. Purchases of these families as a proportion of all purchases of these products were:

<u>Item</u>	<u>Percent</u>
Canned orange juice	50.5
Orange-grapefruit blend	48.0
Canned grapefruit juice	46.0
Lemons	42.6
Grapefruit	35.9
Oranges	34.7

For one citrus product, canned single-strength orange juice, a more intensive study was made of the variation in purchases between individual families. The 292 families buying canned orange juice during the 1-year period were arrayed according to total purchases. Twenty percent of these families bought 46 ounces or less, while purchases of the next 20 percent varied from 54 ounces up to 136 ounces -- less than three 46-ounce cans. The purchases by these 40 percent of the buying families accounted for less than 6 percent of the total orange-juice purchases by all families (table 4).

Table 4.- Distribution of 292 families that bought canned orange juice according to volume of purchases, November 1948-October 1949

Volume of purchases (equivalent 46-ounce cans)	Average volume of purchases	Percentage of families	Percentage of total purchases
	Equivalent 46-ounce cans	Percent	Percent
22.0 or more	49.3	10	50.5
13.0 - 21.9	17.0	10	17.1
8.6 - 12.9	10.3	10	10.6
6.0 - 8.5 ^{1/}	7.1	10	7.5
4.0 - 6.0 ^{1/}	4.7	10	4.7
3.0 - 4.0 ^{1/}	3.4	10	3.8
1.1 - 2.9	1.9	20	4.2
0 - 1.0 .....	.8	20	1.6

^{1/} These class intervals overlap because several of the families bought equal quantities of orange juice.

^{13/} See footnote 2, p. 3.

The cumulative distribution of purchases of canned orange juice was plotted in figure 2. This chart is similar to the Lorenz curve which is used to depict the concentration of production or income among a few firms or individuals. ^{14/} The diagonal indicates the line of distribution assuming an equal volume of purchases by each buying family. The concave line illustrates the high proportion of total purchases made by a relatively small proportion of the families. The symmetry of this line with respect to the axes should be noted. For example, 40 percent of total purchases was made by 6 percent of all families, while 6 percent of total purchases was made by the 40 percent of the families making smallest purchases -- refer to figure 2.

Similar distributions would probably be obtained for the other canned citrus juices. The distributions for the fresh citrus fruits would also resemble the curve in figure 2, but would be less concave, reflecting a lesser degree of concentration of purchases among a few families.

The wide variability between families in frequency and volume of purchases is an important factor to consider in presenting and using statistics on purchases or consumption of citrus. For example, distributions of family expenditures (or purchases) on citrus products are very skewed so that average values are representative of only a small proportion of the families. The usual method of ascertaining average purchases is to divide the total quantity bought by all families by total number of families (or total number of persons) to obtain per family (or per capita) figures. Unless a very high proportion of the families buy a product, averages based on number of families buying may be more meaningful. On the other hand, if a large proportion of these buying families made infrequent purchases involving only a small volume, averages based on buying families are also inadequate. Frequency distributions of families according to volume of purchases can supplement and aid in the interpretation of average volume figures (table 4).

HOUSEHOLD PURCHASES OF FROZEN CONCENTRATED ORANGE JUICE

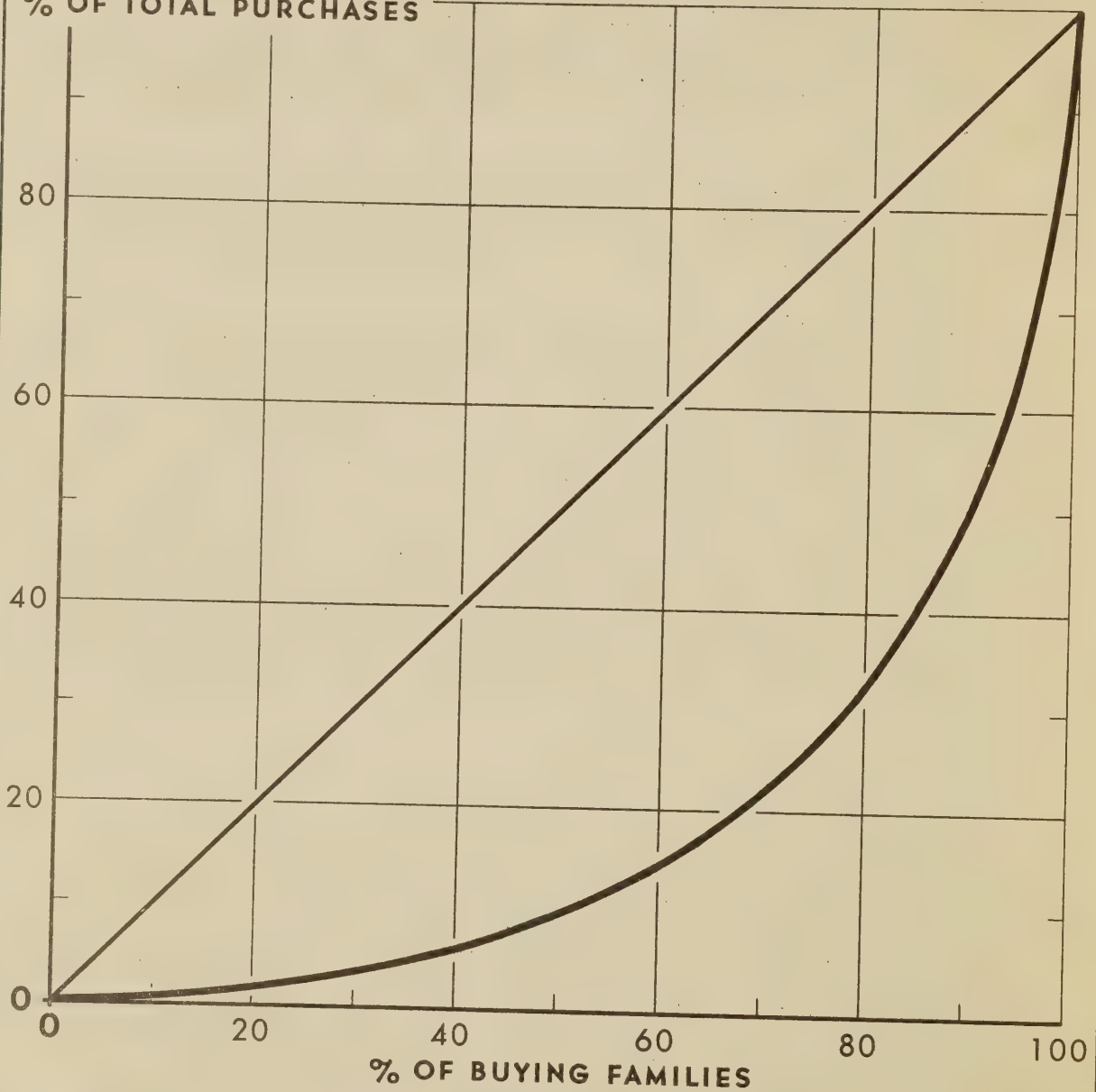
The marketing season covered by these purchase data, November 1948 to October 1949, was the first one in which frozen concentrated orange juice was widely distributed at the retail level. This period was marked by a very rapid growth in sales of this product. According to figures based on the total consumer panel of Industrial Surveys Company, purchases of frozen concentrated orange juice by household consumers increased from 227,000 gallons in January 1949 to 1,076,000 gallons in October 1949, an average monthly increase of about 100,000 gallons. These purchase data, therefore, could be effectively utilized in studying the characteristics of new buyers of frozen concentrated orange juice. Since October 1949, sales have continued to increase, but at a considerably slower rate. In October 1951 total household purchases exceeded 2,600,000 gallons. ^{15/}

^{14/} Croxton, F. E., and Cowden, D. J., Applied General Statistics (Prontice-Hall, Inc., New York, 1946), pp. 188-90.

^{15/} Consumer Purchases of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits in October 1951, and preceding monthly reports. The volume figures in these reports were obtained from the total consumer panel of Industrial Surveys Company. The data on household purchases are based on 4-week periods in order to permit comparisons between periods of equal length.

CUMULATIVE PERCENTAGE DISTRIBUTION OF CANNED ORANGE JUICE PURCHASES

% OF TOTAL PURCHASES



500 URBAN FAMILIES IN CONSUMER PANEL, NOV. 1948-OCT. 1949

U. S. DEPARTMENT OF AGRICULTURE

NEG. 48370-X BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 2

"Repeat" Purchasing by Individual Families

During the 1-year period covered in this study, 44 percent of the sample families (220 families out of 500) bought frozen concentrated orange juice at least once. In any single month, however, a much smaller proportion of these families bought it. The percentage varied from 2 percent in November 1948 to 22 percent in October 1949, reflecting the upward trend in purchases of frozen orange juice throughout that marketing season. Nevertheless, half of the families that bought it some time during the year did not buy during the peak month, October. An analysis of the buying practices of the 220 buying families is made in this section to ascertain the extent of repeat buying of frozen concentrated orange juice and the relationship to buying of other orange products.

About one-fifth of these buying families made their first purchases of frozen concentrated orange juice during one or both of the last 2 months in the 1-year period, September and October 1949. These families were eliminated from this analysis because no conclusions could be reached concerning the nature of their repeat buying.

Families purchasing frozen concentrated orange juice before September 1949 totaled 172. Slightly more than 40 percent, 72 families, were designated "steady" purchasers of the product. These families continued to buy it during nearly every month after their first purchase. During the last quarter of this 1-year period all of these families were "steady" buyers of the product.

About 46 percent of those families that bought frozen orange juice before September stopped buying it before the end of the period. Most of these families bought it during only 1 or 2 months, although a few families bought it during 5 or 6 months in the early part of the period, and then stopped buying. In addition, another 12 percent of the families bought at infrequent intervals throughout the period. These families did not clearly belong in either the group of "steady" purchasers or the group of families that discontinued buying frozen concentrated orange juice.

Thus, over one-half of the families that bought frozen concentrated orange juice before September 1949 did not become "steady" purchasers of the product. No relationship was observed between family income and repeat purchasing. A larger proportion of the higher income families made purchases during the 1-year period, but the percentage of buying families that did not become "regular" purchasers was about equal in all income groups.

The buying practices of these "nonregular" purchasers of frozen concentrated orange juice were found to be related to the buying of canned single-strength orange juice and fresh oranges. About 62 percent of these families also bought canned orange juice during this 1-year period. About one-third of these families who bought both products bought the canned product regularly throughout the year. These families tried the new frozen orange juice but apparently preferred the canned orange juice. The lower price for canned juice may have influenced their continued buying of the canned product. The remaining two-thirds of these families buying both canned and frozen juice, however, did not buy either regularly throughout the year.

Almost all of these "nonregular" purchasers of frozen concentrated orange juice bought fresh oranges during the 1-year period, and more than 60 percent bought fresh oranges in almost every month in the year. The remaining families either bought no oranges or bought only during infrequent intervals throughout the period. Thus, a sizable proportion of families made trial purchases of frozen concentrated orange juice but did not shift their buying from fresh oranges to the new product.

In summary, the purchasing pattern of families buying frozen concentrated orange juice indicated that less than half of them became steady purchasers of the product during the period for which these data were available. ^{16/} About 12 percent of the families bought during a few months but not regularly, while the remaining 46 percent made only a few trial purchases of frozen orange juice and then stopped buying it. Among these trial purchasers, about 30 percent of the families were also infrequent buyers of other orange products -- canned single-strength orange juice and fresh oranges. The remaining 70 percent were steady purchasers of one or both of these other two products. These families, about one-third of all the families that bought frozen concentrated juice, did not shift their orange purchases away from the fresh or canned form to the frozen products. But changes in price relationships and quality differences between the three products may influence some of these families to return to frozen-juice buying.

Effects on Purchases of Other Products

The 72 families designated "regular" purchasers of frozen concentrated orange juice accounted for the major portion of total purchases during the 1-year period. Average purchases of these 72 families by quarters were:

<u>Period</u>	<u>6-ounce cans</u>
First quarter (Nov. 1948-Jan. 1949)	1.2
Second quarter (Feb.-Apr. 1949)	3.2
Third quarter (May-July 1949)	10.0
Fourth quarter (Aug.-Oct. 1949)	13.6

Frozen orange juice purchases by the remaining 428 families also increased throughout the year, but at a much lower rate. On a per family basis, average purchases by these families in the fourth quarter were only 5 percent as large as the average purchases of the 72 families.

The purchase data for the 72 "regular" buyers of frozen concentrated orange juice were tabulated for fresh oranges, canned single-strength orange juice, and several other canned juices in order to relate the increased purchasing of frozen orange juice throughout the year to changes in purchases of these other products. The purchase pattern of these families was also compared with that for all other families in the sample.

^{16/} As mentioned earlier, the families that bought during the last 2 months of the year were not considered in this analysis. The statements made in this summary paragraph refer only to the families that made their first purchase of frozen concentrated orange juice before September.

Fresh Oranges and Canned Orange Juice -- During the 1-year period 44 families (61 percent) that bought frozen concentrated orange juice regularly also bought canned single-strength orange juice at some time during the year. Almost half of these families buying both orange-juice products stopped buying the canned product after beginning frozen-juice purchases. Only 10 percent continued to buy canned orange juice regularly, while the remaining 40 percent of these families bought the canned product at infrequent intervals throughout the year.

Fresh oranges were bought by almost all of these 72 families at some time during the year. More than half of these families discontinued buying fresh oranges after buying frozen orange juice, which indicated substitution of the frozen juice for freshly squeezed orange juice by many families. But about one-fourth of the families continued to buy fresh oranges at approximately the same rate in addition to their frozen-juice purchases. The other families (16) bought fresh oranges infrequently so that their purchases of frozen juice also represented a net gain in buying of orange products.

About 65 percent of these "regular" purchasers of frozen concentrated orange juice stopped buying either one or both of the other two orange products, fresh oranges and canned single-strength juice. Most of the other 35 percent of these families increased their total purchases of orange products because frozen-juice buying was an addition to other purchases. Total purchases of fresh oranges and canned orange juice by all families in the sample, however, declined during this 1-year period. To obtain a clearer picture of the substitution pattern between these three orange products, the volume of purchases on an equivalent-fresh-orange basis for both groups of families is analyzed in the following paragraphs. 17/

The buying of frozen concentrated orange juice increased markedly the total purchases of oranges (including fresh oranges, frozen concentrated and canned single-strength orange juice) among the 72 families that bought frozen concentrated orange juice regularly. Thus, if this sample is representative of urban households, buying of frozen concentrated orange juice should greatly increase the demand for oranges and orange products. Large purchases of frozen concentrated orange juice would increase consumption of oranges during the summer when market supplies of fresh oranges are usually at a seasonal low.

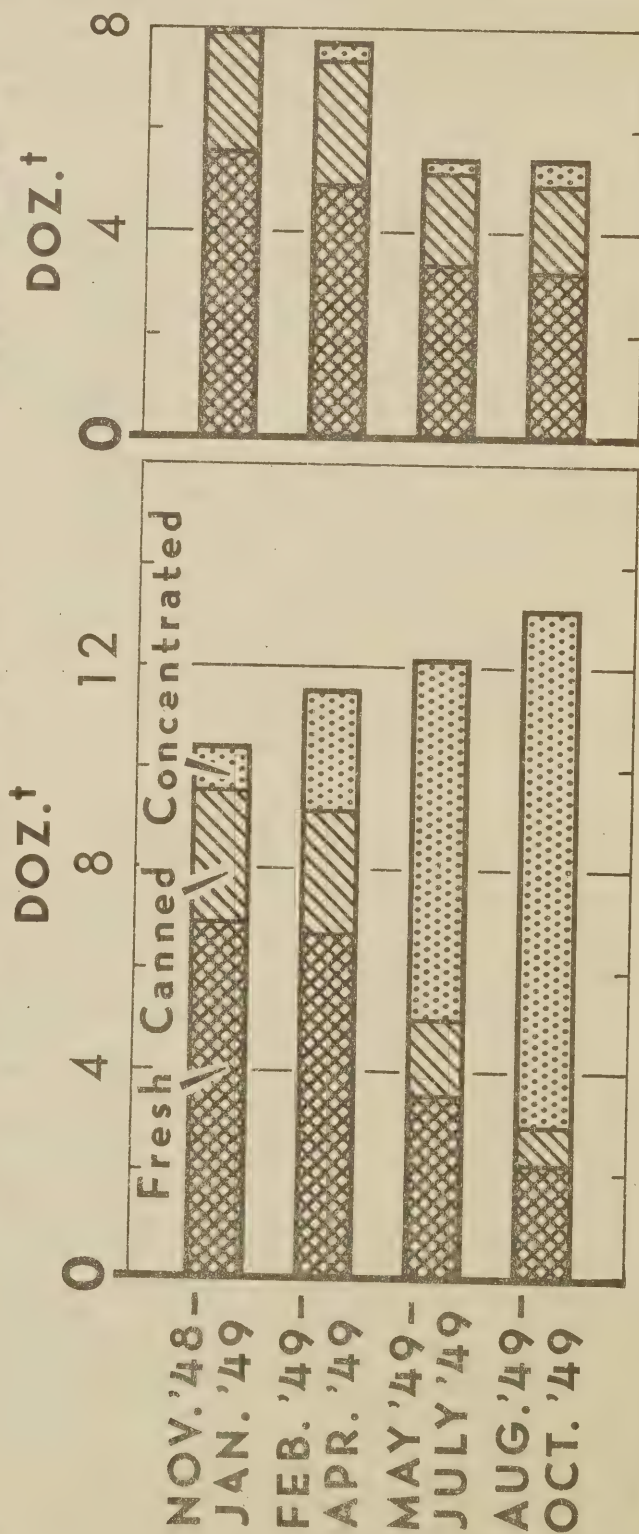
Average purchases of oranges by the 72 families increased from 10.4 equivalent dozens in the first quarter of the marketing season (Nov. 1948-Jan. 1949) to 13.1 dozens in the fourth quarter (Aug.-Oct. 1949), which is normally a low point in purchases of fresh oranges. At the same time, the volume of oranges and orange products bought by the remaining 428 families in the sample decreased from an average of 8.0 equivalent dozens in the first quarter to 5.4 dozens in the fourth quarter. For the first group of families, average volume of purchases increased in each quarter, whereas for the second group purchases declined in each quarter, which is the normal seasonal pattern for fresh oranges. These variations between the two groups of families in purchases of the three orange products during the four quarterly periods are illustrated in table 5 and figure 3.

17/ One dozen oranges equals 8 ounces frozen concentrated orange juice or 32 ounces canned single-strength orange juice. This is an average relationship that will vary, of course, depending upon the size and juice content of the fresh oranges.

PURCHASES OF ORANGE PRODUCTS

Shifts in Av. Volume, by Family Groups, 1948-49

"REGULAR" BUYERS OF CONCENTRATE* OTHER FAMILIES^o



* "REGULAR" PURCHASERS OF FROZEN CONCENTRATED ORANGE JUICE (72 FAMILIES)
^o ALL OTHER FAMILIES IN CONSUMER PANEL (428 FAMILIES)

† DOZENS ON EQUIVALENT FRESH ORANGE BASIS, 1 DOZ. = 8 OZ. FROZEN JUICE = 32 OZ. CANNED JUICE

Table 5.- Fresh oranges, frozen concentrated orange juice, and canned single-strength orange juice: Average volume of purchases by two groups of families, November 1948-October 1949 ^{1/}

Period and group	Frozen concentrated: orange juice	Canned orange juice	Fresh oranges	Total
	Equivalent dozens ^{2/}	Equivalent dozens ^{2/}	Dozens	Equivalent dozens ^{2/}
Nov. 1948-Jan. 1949				
72 families	0.9	2.6	6.9	10.4
428 families .....	.1	2.4	5.5	8.0
Feb.-Apr. 1949				
72 families	2.4	2.4	6.7	11.5
428 families .....	.4	2.4	4.9	7.7
May-July 1949				
72 families	7.1	1.5	3.5	12.1
428 families .....	.3	1.8	3.3	5.4
Aug.-Oct. 1949				
72 families	10.2	.7	2.2	13.1
428 families .....	.5	1.7	3.2	5.4

^{1/} The 72 families were "regular" buyers of frozen concentrated orange juice. The other 428 families constituted the remainder of the families in the sample.

^{2/} One dozen oranges equals 8 ounces frozen concentrated orange juice or 32 ounces canned orange juice.

If the purchases of all orange products by these 72 families had declined from the first to the fourth quarter by the same amount as the purchases of all other families, their average purchases would have equaled 7.8 equivalent dozens in the fourth quarter instead of 13.1 dozens. An equal relative decline in purchases may also be assumed. Then the average volume of purchases by these families would have dropped to 7.0 dozens, compared with the actual volume of 13.1 equivalent dozens. In either case it is apparent that total purchases of oranges and orange products were nearly doubled as a result of purchases of frozen concentrated orange juice by these families.

Purchases of frozen concentrated orange juice apparently reduced the buying of both fresh oranges and canned orange juice of these 72 families by more than 50 percent. Purchases of canned orange juice by the 72 families dropped from an average of 32 ounces in the first quarter to 22 ounces in the fourth quarter. The average volume of purchases by the other 428 families decreased from 77 ounces to 53 ounces between the same quarters. Assuming an equal decline for the 72 families, their purchases would have averaged 58 ounces in the fourth quarter instead of 22 ounces.

Purchases of fresh oranges by the 72 families declined from an average of 6.9 dozens in the first quarter to 2.2 dozens in the fourth quarter and purchases by the other 428 families dropped from 5.5 dozens to 3.2 dozens between the same quarters. If the purchases by the 72 families had dropped by the same amount as those of the other families, their purchases would have averaged 4.6 dozens in the fourth quarter, compared with the actual volume of 2.2 dozens. Assuming the same relative decline, purchases by the 72 families would have dropped to 4.0 dozens in the fourth quarter.

The preceding analysis assumes that the buying pattern of the 72 families would parallel the buying pattern observed for the remaining families if they had not made regular purchases of frozen concentrated orange juice. In the first quarter these 72 families bought a larger volume of orange products, particularly fresh oranges. A large proportion of these families was located in the Northeast, where average purchases of citrus products were larger than in other regions. Therefore, the purchase pattern of the northeastern families that bought frozen orange juice regularly was compared with the purchase pattern of the remaining families in the Northeast.

In the northeastern region 41 families were designated "regular" buyers of frozen concentrated orange juice. The orange purchases of these 41 families throughout the four quarterly periods were compared with those of the remaining 153 northeastern families (table 6). In general, a similar pattern of shifts was noted in purchases of the three orange products for the two groups of northeastern families as that observed for all families in table 5 and figure 3. The "regular" buyers of frozen concentrated orange juice increased their average purchases of oranges and orange products throughout the 1-year period whereas the average purchases of the other northeastern families declined during each quarter. The level of average purchases of orange products was higher for the two groups of northeastern families by about 2 equivalent dozens per quarter. Larger purchases of fresh oranges in the Northeast than in other regions accounted for this difference.

Table 6.- Fresh oranges, frozen concentrated orange juice, and canned single-strength orange juice: Average volume of purchases by two groups of northeastern families, November 1948-October 1949 ^{1/}

Period and group	Frozen concentrated: orange juice:	Canned orange juice:	Fresh oranges	Total
	Equivalent dozens ^{2/}	Equivalent dozens ^{2/}	Dozens	Equivalent dozens ^{2/}
Nov. 1948-Jan. 1949				
41 families	0.8	2.8	9.0	12.6
153 families .....	.2	2.7	8.5	11.4
Feb.-Apr. 1949				
41 families	2.6	3.7	8.1	14.4
153 families .....	.6	2.4	7.4	10.4
May-July 1949				
41 families	8.5	1.5	3.4	13.4
153 families .....	.6	1.7	5.1	7.4
Aug.-Oct. 1949				
41 families	11.1	.8	2.9	14.8
153 families .....	.7	1.9	5.4	8.0

^{1/} The 41 families were "regular" buyers of frozen concentrated orange juice. The other 153 families constituted the remainder of the sample families living in the Northeast.

^{2/} One dozen oranges equals 8 ounces frozen concentrated orange juice or 32 ounces canned orange juice.

Other Canned Juices.-- The volume of household purchases of canned single-strength grapefruit juice and blended orange-grapefruit juice was lower in the second half of the 1-year period among both groups of families-- the 72 families that bought frozen concentrated orange juice regularly and the remaining 428 families in the sample. The decline in purchases of both these juices, however, was somewhat greater for the 72 families with a larger decline in purchases of blended juice. Purchasing of frozen concentrated orange juice apparently decreased the purchases of these other canned citrus juices but the differences between the two groups of families was much less than for canned single-strength orange juice.

Purchases of canned tomato juice, pineapple juice, and "other canned juices" by the two groups of families were compared. In general, changes in purchasing of these juices during the 1-year period were rather similar for the two groups of families, indicating that increased purchases of frozen concentrated orange juice by the 72 families did not greatly reduce their buying of these noncitrus juices.

Effect on Over-All Demand for Citrus Fruit

Some preliminary conclusions about the effect of sales of frozen concentrated orange juice on the demand for citrus fruit are indicated by the results of this study and other available purchase data. Frozen concentrated citrus juices, however, are still in a dynamic stage of development. Changing price relationships between the various products can alter the future pattern of citrus consumption.

Based on the purchase patterns of those sample families that bought frozen concentrated orange juice regularly, purchases of orange products will be increased substantially during the summer when the market supply of fresh oranges reaches a seasonal low. This increase in summer purchases will represent a net increase in the total consumer demand for oranges.

These purchase data also indicate that purchases of frozen concentrated orange juice resulted in decreased buying of fresh oranges and canned orange juice. The increased purchases of the frozen product, however, more than offset declines in purchases of the other orange products. At the end of the 1-year period, average purchases of all orange products by the 72 families that bought frozen concentrated orange juice regularly were more than double the average purchases of the other sample families. These families represented about 14 percent of all families in this sample. On the basis of all urban families, therefore, the increase in purchases was about 14 percent but the increase in production of oranges during the next few years probably will be larger than 14 percent. But the proportion of urban families buying frozen concentrated orange juice regularly is much higher than 14 percent at the present time. The proportion of all families that bought and total household purchases in October 1951 were about 100 percent above the average recorded for the last 3 months of the 1-year period in this study, August to October 1949. 18/

18/ Based on the reports of the total consumer panel of the Industrial Surveys Co., published in the U. S. Dept. of Agr. monthly publication, Consumer Purchases of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits.

Availability of frozen concentrated orange juice in retail stores is increasing most rapidly in rural areas and in geographic regions outside the Northeast. 19/

With purchase data extended through the marketing season (1950-51), there would be an unique opportunity for analyzing price-volume relationships. During this 1-year period, prices of frozen concentrated orange juice averaged 26.5 cents per 6-ounce can with relatively minor monthly variations in price; but at the beginning of the 1950-51 marketing season, the price dropped from an average of 25.5 cents per 6-ounce can in September to 22.1 cents in October 1950. Household purchases increased more than 25 percent, from 1,470,000 gallons to 1,856,000 gallons -- the largest increase in purchases recorded for a single month. 20/ Average prices and purchases remained near these levels from October 1950 to July 1951. The study of family purchase data over this period would reveal characteristics of new buyers and changes in volume of purchases by old buyers. A question of particular interest in this respect is the extension of the market into lower income groups through these reductions in price.

In general, sample families that bought frozen concentrated orange juice were those with relatively large purchases of all citrus products. For example, 66 percent of the families in the highest quartile of citrus buyers bought the product compared with only 18 percent among those in the lowest quartile. The opportunity for expanding total citrus consumption as a result of the introduction of frozen concentrated juices is greatest among those families that are consuming citrus at a low per capita rate. Families that are already buying citrus in large volume are more likely to substitute frozen concentrated citrus juices for other citrus products.

Thus far, orange juice has constituted almost the entire pack of frozen concentrated citrus juices. The pack of frozen concentrated orange juice totaled about 25 million gallons in the 1949-50 season; an estimated pack of 35 million gallons is expected in the 1950-51 season. Production of both frozen concentrated grapefruit juice and orange-grapefruit blended juice will exceed 100,000 gallons in the 1950-51 season. Further increases in the production and household buying of these products may also result in greater consumer demand for grapefruit.

About 85 percent of the frozen concentrated orange juice is now being made in Florida. Because of higher costs of production per box of fruit and lower yields of juice, the California citrus industry is in a less favorable competitive position in marketing frozen concentrated juices. Any shifts in consumer demand from fresh fruit to frozen concentrated juice may affect adversely the California citrus industry. It is significant that new orange plantings are increasing rapidly in Florida, whereas new citrus plantings in California are principally in the form of lemon groves. At present, California marketing agencies are actively promoting a frozen lemon juice for lemonade. This new product may increase consumer demand for lemons and may possibly compete with summer consumption of orange juice.

19/ Availability of Fresh Citrus Fruits, Canned and Frozen Juices, and Dried Fruits in Retail Food Stores, February 1951, Fruit and Vegetable Branch, PMA, U. S. Dept. of Agr., Apr. 1951.

20/ Consumer Purchases of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits in October 1950, BAE and Fruit and Vegetable Branch, PMA, U. S. Dept. of Agr., Nov. 1950.

FACTORS RELATED TO VARIATIONS IN FAMILY PURCHASES OF CITRUS PRODUCTS

These purchase data for the 500 sample families included information on place of residence, income, and several other characteristics for each of the 500 families. A major objective was an analysis of the relationship between citrus purchase patterns and these various factors, particularly income. The wide variability in frequency and volume of purchases between individual families discussed in a preceding section of this report restricts the applicability of generalizations between "groups" of families. Nevertheless, large differences were noted between some "groups" of families in their purchase patterns, both for all citrus and for individual citrus products.

Income

Family Income Grouping.-- In order to study the relationship between purchasing of citrus products and level of family income, the 500 panel families were divided into six family income groups. The average family expenditure for citrus products increased with each higher family income group (table 7). Income rose proportionately faster than expenditures, however, indicating an income elasticity of expenditures for citrus of less than 1.0. 21/

The three income groups included in the range from \$3,000 up to \$7,000 did not differ markedly in total family expenditures on citrus products. Family expenditures in the highest income group averaged about 20 percent above the average of those three groups, whereas expenditures of families in the two lowest income groups were considerably below the average of those middle groups. Expenditures of the lowest family income group (under \$2,000) averaged more than 50 percent below the average expenditure of all families. The average size of family in this group was only 2.1, compared with an average of 3.4 for all families. On a per capita expenditure basis, therefore, the average expenditures of this group would not be as far below the other family groups. (The average size of family in the other five income groups was approximately equal.)

The income-expenditure relationship for these 500 families was more pronounced in the low- and high-income brackets than in the middle-income range. Above a certain low level of income (in this study \$3,000) the average expenditure on citrus products was approximately the same for all family income levels until a higher income level of about \$7,000 was reached. If this observation applies for all families in the United States, then the importance of the income-expenditure relationship in purchasing of citrus products may be overemphasized because the majority of families are included in the middle-income group.

21/ Income elasticity of expenditure -- percentage change in expenditures/percentage change in income -- is a quantitative measurement of the relationship between expenditures and income. In The Consumer and the Economic Order, Waite and Cassady stated that the elasticity of consumption for all food was within the range 0.50 to 0.74 in 22 out of 24 expenditure studies of United States city families. (Waite, W. C., and Cassady, Ralph, The Consumer and the Economic Order, McGraw-Hill Book Co., Inc., New York, 1939, p. 188.) Family budget studies that have analyzed citrus products separately have estimated the elasticity of expenditure for most citrus products in the range from 0.5 to 1.0.

Table 7.- Average expenditure per family for all citrus products,
by family income groups for 500 sample families,
November 1948-October 1949

Family income (dollars)	Average family income	Average expenditure for citrus products
	Dollars	Dollars
Under 2,000	1,100	8.25
2,000 - 2,999	2,500	14.02
3,000 - 3,999	3,340	17.31
4,000 - 4,999	4,390	17.82
5,000 - 6,999	5,580	18.36
7,000 and over	9,170	21.39

The Bureau of Human Nutrition and Home Economics in the spring of 1948 made a survey of the food consumption among 1,600 urban households. As in the 500 panel families, the variations in expenditures for citrus by income classes were smallest among the middle-income families (table 8). The Bureau of Human Nutrition and Home Economics also made a survey in 1942 of family food consumption. A possible change in the income elasticity of the consumption of citrus fruit between 1942 and 1948 was reported in Commodity Summary No. 8, Citrus Fruit Consumed By City Families: 22/

Higher citrus fruit consumption by the low-income groups in 1948 and lower consumption by the upper income groups indicates a reduction in the influence of income on citrus fruit consumption.. Thus the rate of increase in consumption of citrus fruit with rising income was less in 1948 than in 1942.

Table 8.- Average weekly expense per household for all purchased food and citrus fruit, by annual income class, spring 1948

Income class (1947 income after Federal income tax) (dollars)	Total expense for food at home	Total expenditures for citrus fruit
	1/ Dollars	2/ Dollars
Under 1,000	14.42	0.36
1,000 - 1,999	18.01	.46
2,000 - 2,999	21.64	.55
3,000 - 3,999	25.54	.68
4,000 - 4,999	25.85	.73
5,000 - 7,499	25.33	.82
7,500 and over	33.38	1.14

1/ Food Consumption of Urban Families in the United States, Spring 1948, Preliminary Report No. 5, BHNHE, U. S. Dept. of Agr., May 1949, p. 8.

2/ Citrus Fruit Consumed by City Families, Commodity Summary No. 8, BHNHE, U. S. Dept. of Agr., Mar. 1950, p. 3.

22/ Citrus Fruit Consumed by City Families, Commodity Summary No. 8, BHNHE, U. S. Dept. of Agr., Mar. 1950, p. 14.

The influence of income on household purchases of citrus fruits was reported in two recent postwar studies of consumer preferences for citrus fruit. ^{23/} These studies were conducted in two local areas, Houston, Tex., and Louisville and Nelson County, Ky. The relationships between income and consumption of citrus products reported in these studies were not pronounced. The study in Louisville indicated that among urban households (Louisville families) "little relationship between family income and either general use or frequency of use of any of the items [citrus products] was found" but among the rural households (Nelson County) "there was much more evidence of a direct relationship between use of these items and family income." ^{24/} In the Houston study some relationship was observed between income and consumption. "With the exception of frozen orange juice concentrate, there was no direct relation between family income and whether a given citrus product was consumed. In contrast, the amounts of the products consumed per family increased when the family income increased." ^{25/} It should be noted that the Houston householders were selected from a high-income area with a median income of about \$7,200.

The association between family income levels and average expenditures per family on individual citrus products is shown in figures 4 and 5. For only two products, frozen concentrated orange juice and fresh grapefruit, were there increased purchases in each higher income group. Differences between income groups were pronounced in expenditures for frozen concentrated orange juice. No consistent pattern between income and expenditures was noted for the other products.

Expenditures in the highest family income group (\$7,000 and over) were higher than in the two lowest income groups (under \$3,000) for almost all products, with larger differences for fresh citrus fruit and frozen concentrated orange juice than for the canned juices. This variation may have been related to the prices of those products because canned juices, in general, cost less during the period covered in this study than equivalent quantities of juice in fresh citrus fruits and frozen concentrated orange juice.

Average expenditures and average volume of purchases for the citrus products and other canned juices were computed both on the basis of all families in each family income group and only those families that bought the product (tables 12 and 13). In general, average purchases per buying family varied less between income groups than average purchases of all families in each income group. The usual method of ascertaining average consumption (or purchase) figures is to divide the total quantity by the total population. Often averages based only on numbers of people consuming or buying a product may be useful in evaluating the potential market for the product. Many of the families in the sample, however, made such infrequent purchases of some citrus products that they would hardly qualify as a "user" of the product (pp. 12 and 13 of this report). An arbitrary definition for a "user" of a product would be necessary in order to adequately compare expenditures and volume per buying family. ^{26/}

^{23/} Citrus Preferences Among Household Consumers in Louisville and in Nelson County, Ky., Agr. Inform. Bul. No. 2, U. S. Dept. of Agr., Jan. 1950.

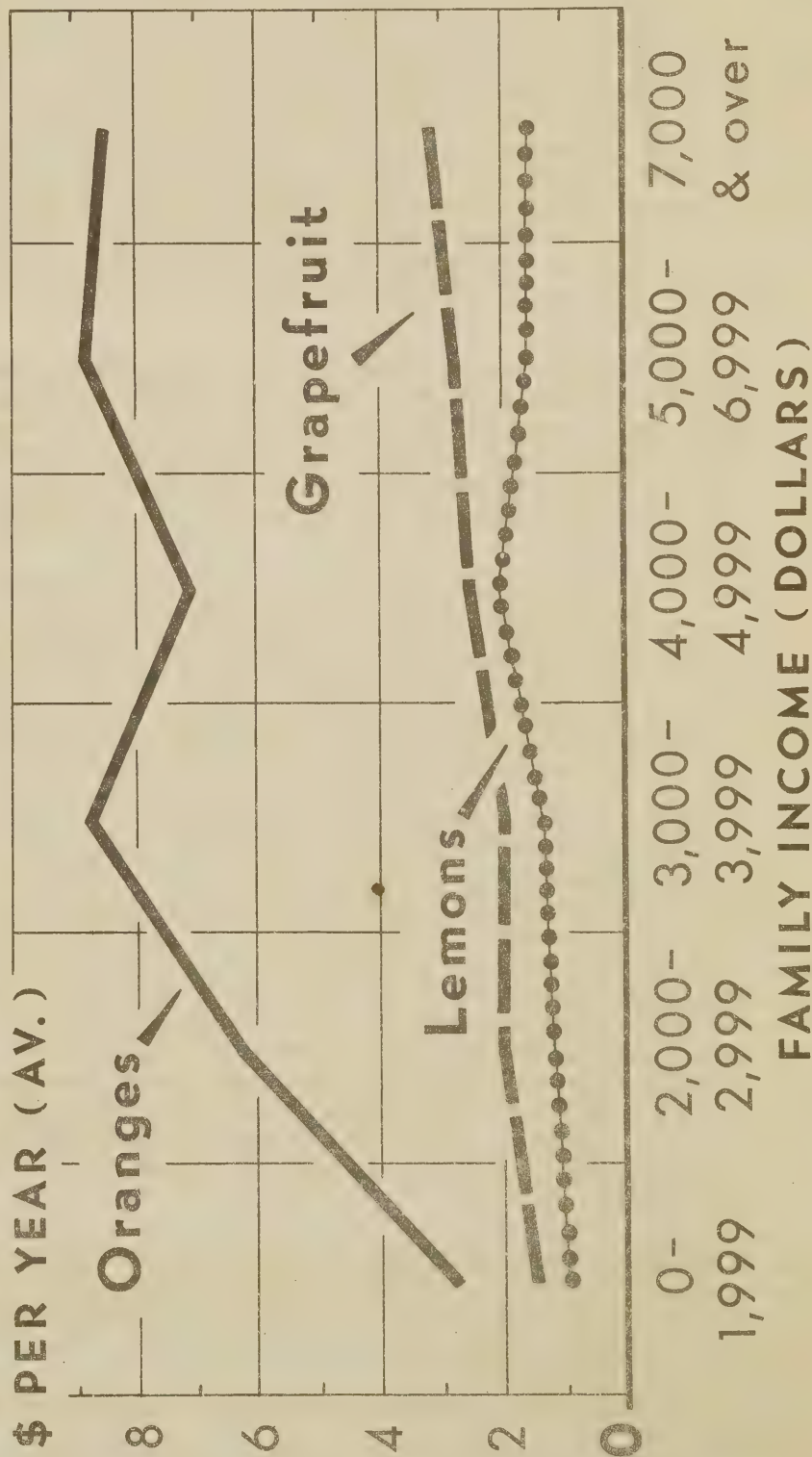
Fugett, K. A., Bayton, J. A., and Bitting, H. W., Citrus Preferences Among Customers of Selected Stores, Texas Agr. Expt. Sta. Bul. No. 722, College Station, Tex., June 1950.

^{24/} Citrus Preferences Among Household Consumers in Louisville and in Nelson County, Ky., p. 6.

^{25/} Fugett and others. See footnote 23, above. (See p. 14.)

^{26/} This definition is necessary when purchase data are available over a period of 1 year or longer. In a period covering 1 or 2 weeks, many of these infrequent buyers would fall into the classification of nonusers.

FAMILY EXPENDITURES FOR FRESH CITRUS FRUITS, BY INCOME GROUPS



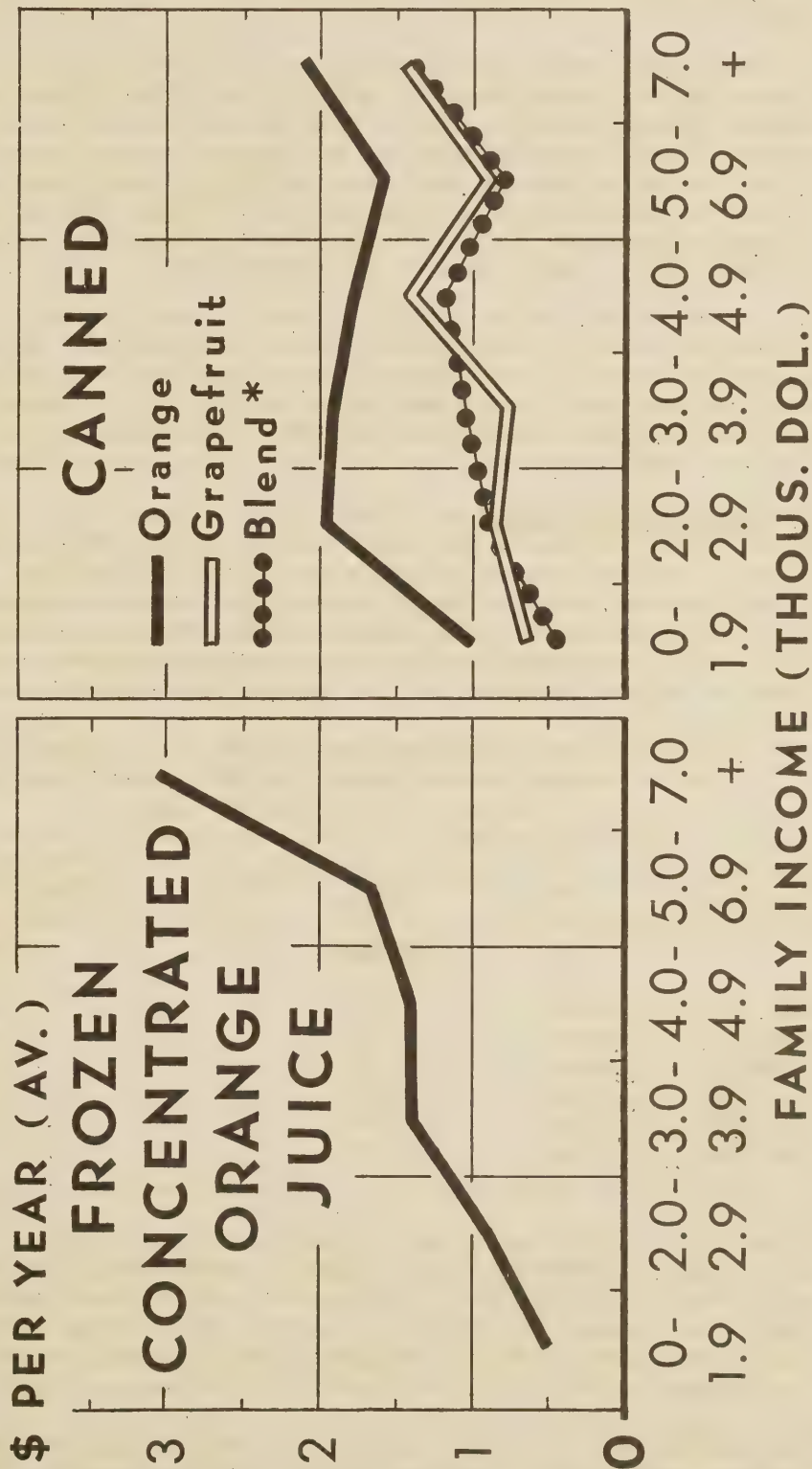
500 URBAN FAMILIES IN CONSUMER PANEL, NOV. 1948 - OCT. 1949

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FIGURE 4

FAMILY EXPENDITURES FOR CITRUS JUICES, BY INCOME GROUPS



500 URBAN FAMILIES IN CONSUMER PANEL, NOV. 1948 - OCT. 1949

* ORANGE - GRAPEFRUIT

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FIGURE 5

A larger proportion of families in the higher income groups bought the various citrus products than those in the lower income groups. These differences between income groups were more evident for fresh citrus fruits and frozen concentrated orange juice than for the canned single-strength juices (table 14).

The market for frozen concentrated orange juice was more heavily concentrated among higher income families than for any other citrus product. The proportion of buying families ranged from 29 percent in the lowest income group (under \$2,000) to 60 percent in the highest income group (\$7,000 and over). The average volume of purchases per buying family varied from 7 6-ounce cans in the lowest income group to 18 6-ounce cans in the highest income group, whereas the average volume for all families in each income group ranged from 2 6-ounce cans to 11 6-ounce cans.

The lowest income groups paid the lowest average prices per dozen for the fresh citrus fruits, particularly oranges and lemons. These lower prices may reflect the buying of smaller and poorer quality fruit by these families. The average prices paid for canned juices did not differ greatly between income groups; the price variations observed for canned juices did not follow any consistent pattern between the different income classifications (table 15).

Per Capita Income Groups.-- Average expenditures on the various citrus products and other juices by per capita income groups were computed for both average family expenditure and average per capita expenditure. There was no apparent association between family expenditure on citrus products and per capita income groups because the higher income groups had small-sized families. ^{27/} But a consistent relationship was noted between average per capita expenditure on citrus products and per capita income groups (table 9).

Table 9.-- Average expenditure per capita on all citrus products
by per capita income groups for 500 sample families,
November 1948-October 1949

Per capita income (dollars)	Average per capita income	Average per capita expenditure on citrus products
	Dollars	Dollars
Under 600	400	3.37
600 - 899	750	4.46
900 - 1,199	1,050	4.53
1,200 - 1,799	1,500	5.28
1,800 - 2,399	2,050	5.63
2,400 and over	3,400	7.48

Average per capita expenditures increased in each higher income group, with the average expenditure in the highest income group more than double that in the lowest income group. Average income increased proportionately faster than the average expenditure, however. The income elasticity of expenditures on citrus products averaged about 0.5 among these sample families, regardless of which income classification was used. ^{28/}

^{27/} The average size of family varied considerably between these per capita income groups, with larger families in the lower per capita income groups.

^{28/} Income elasticities of expenditure were computed for: (a) family income and family expenditure, (b) per capita income and per capita expenditure.

Average per capita expenditures on individual citrus products and the other canned juices were tabulated by per capita income groups (table 16). The variations in expenditures between income groups closely paralleled the relationships between family income and average family expenditures. Average expenditures increased more rapidly from the low to the high per capita income groups for frozen concentrated orange juice than for any other product. Expenditures on all the fresh citrus fruits were largest in the higher income groups. For the canned single-strength citrus juices, expenditure patterns varied considerably between the different products. No apparent relationship was found between per capita income and per capita expenditures for these citrus juices.

Inherent Problems in Selection of Proper Income Classification.-- A continuing problem for research workers in studies of family expenditure has been the choice of an income scale that would adequately measure the effects of income differences between groups of families. Family income is not an entirely satisfactory measure of a family's economic level. For example, a family of two with an annual income of \$6,000 is on a much higher economic plane than a family of six with the same total income, but a family of two with a per capita income of \$1,000 is doubtless on a lower economic plane than a family of six with the same per capita income. The larger family can make more efficient use of housing quarters and appurtenances than the smaller family. Family size cannot be ignored in studying the relationship between income and citrus expenditures.

The characteristics of the sample families in the per capita income classification varied more between groups than in the family classification. Thus, the use of a per capita income classification in analyzing the relationship of income levels to citrus expenditures may be subject to more criticism than a family income grouping. It was evident, however, that neither income classification adequately accounted for the influence of varying size of family and presence of children upon its expenditures.

Hans Staehle discussed some of the "technical difficulties inherent in family budget studies" in an article in Econometrica. 29/ One of the difficulties which Professor Staehle discussed was the selection of a proper income scale. He stated that it was not possible to find a scale which will entirely even out the influence of varying size of the family upon its expenditures.

Family Composition

Presence of Children.-- The presence of children in the family apparently affected the buying pattern of citrus fruit by the 500 panel families. This relationship was also interrelated with size of family and the income level.

Out of the total sample of 500, 291 households had children and 209 had no children. 30/ The size of families without children averaged only 2.2 compared with 4.2 for families with children. The average family income of both these groups was approximately equal -- \$4,164 for families with children and \$4,158 for families without children. But the per capita income of the families without children averaged much higher than the families with children because of the smaller size of the family. On a per capita income basis, the average income of those families without children was almost double

29/ Staehle, H., "Annual Survey of Statistical Information: Family Budgets." Econometrica II, Oct. 1934, pp. 349-53.

30/ Although families with children were classified into several different categories according to the ages of the children, the variations in purchasing of citrus products between these age groups were not markedly different.

that for families with children -- \$1,941, compared with \$1,036. The families without children, therefore, were undoubtedly on a higher economic level, on the average, than the other families.

A larger proportion of the families with children bought citrus products than did the nonchildren families (table 17). Canned grapefruit juice was the only product bought by a larger proportion of nonchildren families, although the average expenditure per family for grapefruit juice was slightly higher among families with children. ^{31/} The presence of children was influential in proportion of households buying canned orange juice, canned blended juice, frozen concentrated orange juice, and fresh oranges (table 17). Supplying orange juice for children probably influenced the buying of orange products by these families.

The radically different composition of these two groups of families precluded a satisfactory analysis of the variations in citrus expenditures between families with children and those without children. A comparison of average family expenditures weighted the group with children too heavily because of the larger families. A per capita comparison weighted expenditures by nonchildren families too much because of the all-adult composition of this group. Some studies of family expenditure have used various adult-male equivalent scales to adjust for number and age of children in the family. These scales, however, can be applied with more reliability to figures for all food expenditures (or consumption) than to individual commodities.

Expenditures on all citrus products during the 1-year period averaged \$18.77 for the families with children and \$13.61 for the families without children. But on a per capita basis, expenditures averaged \$4.41 for families with children, compared with \$6.10 for nonchildren families. Per capita expenditures by families with children would average slightly below that for nonchildren families even if the children in those families were assigned only a weight of 0.5 adult-male equivalent, a relatively low figure. ^{32/}

The average expenditure per family was higher among the families with children for each citrus product and noncitrus canned juice except fresh lemons. But on a per capita expenditure basis, the nonchildren families averaged highest for each product except canned orange juice. The smallest relative differences in per capita expenditures between the two groups were noted for the following products: Blended orange-grapefruit juice, frozen concentrated orange juice, and fresh oranges. The market for fresh oranges and orange products was apparently concentrated more among the families with children than was the market for grapefruit and lemon products.

^{31/} According to reports by Industrial Surveys Co. on the total consumer panel, canned grapefruit juice is bought by a larger proportion of families in the Pacific region than any other region. Almost two-thirds of the sample families in the Pacific region had no children. This may partially account for the higher percentage of nonchildren families buying grapefruit juice.

^{32/} Faith M. Williams listed adult-male equivalent scales for different ages and sex of children used by the Bur. of Labor Statistics and several other food budget studies. According to these various scales, the adult-male equivalent for all children would average considerably higher than 0.5. (Williams, F. M., "The Measurement of Demand for Food," Journal of American Statistical Association, XXIV: Sept. 1929, p. 295.

Size of Family.--- The classification of families according to size was highly correlated with presence of children. For example, 279 families contained less than four members and 221 families four or more; less than one-fourth of the first group contained children, whereas over 90 percent of the second group included children. The effect of size of family and presence of children on citrus purchases, therefore, was a joint relationship. Relative income levels of the different groups was also influential (table 10).

As expected, the larger families had the higher average expenditures per family for citrus products (table 10). The average expenditure, however, did not increase appreciably after the size of family reached four. The per capita expenditure, consequently, was lowest among the largest families. Families with six or more members spent \$3.11 per person during the 1-year period, whereas families with less than three members averaged \$6.73 during the same period. Thus, per capita consumption in the small-size families was greater even if allowance were made for presence of children in the largest families. The small families had a slightly lower average family income but on a per capita basis the income of the smallest size families (less than three) was almost three times that of the largest size families (six and over).

Table 10.-- Average expenditure on citrus products and average income by size of family for 500 sample families, November 1948-October 1949

Size of family (number)	Number of families	Average income		Average expenditure on citrus products	
		Per family	Per capita	Per family	Per capita
	Number	Dollars	Dollars	Dollars	Dollars
1 - 2	148	3,630	2,000	11.90	6.73
3	131	4,080	1,360	14.78	4.93
4	126	4,510	1,130	20.65	5.17
5	54	4,720	940	21.34	4.27
6 - 9	41	4,620	750	20.92	3.11

No definite pattern could be discerned for differences between the family groups in proportion of families buying the various individual products. In general, a smaller proportion of the families with fewer than three members bought fresh oranges and other orange products (table 18). The smallest proportion of families buying frozen concentrated orange juice, however, was among the largest sized families, six or more members per household. 33/

Average per capita expenditures were highest among the smaller families for practically all products. The greatest differences between family-size groups were in the following products: Fresh grapefruit, fresh lemons, frozen concentrated orange juice, pineapple juice, and tomato juice. The contrast

33/ A similar pattern in proportion of families buying frozen concentrated orange juice was observed for the total consumer panel during the period October 1949-March 1950, but the differences between various family size groups were even greater than for these 500 families (Consumer Buying Practices for Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits, Related to Family Characteristics, Region, and City Size, Oct. 1949-Mar. 1950, p. 14).

in buying of frozen concentrated orange juice and other orange products by these family groups should be noted. The larger families reported buying almost as much canned orange juice per capita as the smaller families and per capita purchases of fresh oranges by these families were also fairly large relative to expenditures by the smaller families. But average per family expenditures on frozen concentrated orange juice by families with three and four members were more than double the expenditures by families with over four members (table 19).

Education and Occupation.-- These panel families were grouped into three different educational levels according to the education of the family head -- some college, some high school, and grammar school. Average expenditures on citrus products were highest among families with college education and lowest among those with only grammar school education. Among the families with some college education, 36 percent were in the highest citrus expenditure quartile compared with 14 percent in the lowest quartile.

For occupational status, a large proportion of the professional-executive group were in the two upper expenditure quartiles, but no relationship was observed for the other occupational groups. 34/

The expenditure relationships noted for these educational and occupational groups may be largely the result of differences in income. Family income was positively correlated with both of these factors.

Purchasing of frozen concentrated orange juice varied by educational and occupational groups. Larger percentages of the families in the college education and professional-executive occupational groups bought this product than did those in the other educational and occupational groups.

Age of Family Head.-- The sample families were also divided into groups according to the age of the head of the household. Purchases of citrus products by these 500 panel families apparently were not associated with age of the family head.

Place of Residence

Geographic Region.-- Variations between regions in citrus expenditures were almost as large as the differences between income groups. The average expenditures of sample families living in the Northeast were higher than in any other region and almost double that of the families in the Pacific and Mountain-Southwest States. Families in the North Central States were second highest in average citrus expenditures, but considerably below those in the Northeast. The average family expenditures for citrus products during the 1-year period by geographic regions were: 35/

<u>Region</u>	<u>Dollars</u>
Northeast	20.94
North Central	15.13
South	13.96
Mountain-Southwest	12.18
Pacific	11.18

34/ The sample families were divided into the following occupational groups -- professional and executive, clerical and sales, wage earners (laborer), and unclassifiable.

35/ Fig. 1 indicates the States included in each region.

A high proportion of families in the Northeast bought frozen concentrated orange juice during the 1-year period -- 58 percent, compared with 44 percent of the families in the North Central States and 25 percent of the families in all other regions (table 20). 36/ Differences between regions in proportion of families buying were not so large for the other citrus products. For each of the fresh citrus fruits a larger proportion of the northeastern families made at least one purchase during the 1-year period, but no consistent pattern was evident for the canned single-strength citrus juices. A larger proportion of the families in the Northeast bought the noncitrus juices (pineapple juice and tomato juice).

Average expenditures were larger by the northeastern families than by the families in any other region for each citrus product, except fresh lemons and canned single-strength orange juice. This was true for both average expenditures per buying family and average expenditures of all families in each area.

Differences in average family expenditures between regions were proportionately greater for frozen concentrated orange juice than for any other citrus product. The average family expenditure in the Northeast was \$2.31 compared with \$1.09 in the North Central States and only 62 cents for the families in the other three regions. Northeastern families spent more for frozen concentrated orange juice than for any other citrus juice and only slightly less than for tomato juice. In other regions average family expenditures on frozen concentrated orange juice were considerably below some of the other juices.

The highest average expenditure per family for all oranges was also in the Northeast -- \$9.52, compared with an average of \$7.37 in the North Central States and only \$4.75 for families in the other three regions. Expenditures for grapefruit varied in a similar way between regions, from \$2.93 in the Northeast to an average of \$1.87 for the three regions (South, Mountain-Southwest, and Pacific). Average family expenditures for lemons, however, were highest in these three regions (\$1.66) and lowest in the Northeast (\$1.37). The high consumption of lemons in the South contributed to the higher average figure for these three regions. 37/

Average family expenditures for canned grapefruit juice and canned blended orange-grapefruit juice were highest among northeastern families, but average family expenditures for canned single-strength orange juice were slightly below those in the three regions (South, Mountain-Southwest, and Pacific). A shift from canned orange juice to frozen concentrated orange juice by northeastern families may account for the lower canned orange juice purchases in this region.

36/ The number of sample families in each of the three other regions (South, Mountain-Southwest, and Pacific) was relatively small. Average expenditures for all citrus products in each of these regions were approximately equal and below both the Northeast and North Central States. To provide more valid comparisons with the two larger regions for individual products, therefore, all families in these regions were combined into one group.

37/ In the U. S. Dept. of Agr. report on consumer purchases for the period Oct. 1949-Mar. 1950, the average volume of purchases by families in the South was double that in the North Central and almost 50 percent above the northeast region. The average volume of purchases in the other two regions was also higher than in either the North Central States or in the Northeast. (Consumer Buying Practices of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits, Related to Family Characteristics, Region, and City Size, Oct. 1949-Mar. 1950, p. 37.)

Northeastern families also bought a larger average volume of the canned noncitrus juices. The average family expenditure for pineapple juice in this region was more than double the average expenditure in the other regions. Average expenditures for canned tomato juice and other canned juices were also highest among the northeastern families.

Size of City.-- The sample families living in metropolitan areas of over 1 million population had the largest average expenditures for citrus products during the 1-year period. The average citrus expenditures of these families exceeded by more than 40 percent the average expenditures of the families living in cities with less than 100,000 population. The average family expenditures for citrus products according to city-size classifications were: 38/

<u>Size of city</u>	<u>Dollars</u>
10,000 - 99,999	14.01
100,000 - 499,999	16.01
500,000 - 999,999	15.40
1,000,000 and over	19.94

The differences in average citrus expenditures between the various size-of-city family groups were not so large as they were in the family income and geographic area comparisons. Furthermore, the relationships of size-of-city and geographic residence to citrus purchases were not independent effects. For example, the highest expenditure group, those families living in metropolitan areas of over a million population, included no families from the South and Mountain-Southwest. These two regions had much lower average expenditures for citrus than the northeastern families. 39/

The average yearly expenditures of families living in metropolitan areas of over a million population were higher than either of the other two city-size classifications for each of the citrus products as well as the noncitrus canned juices (table 21). 40/ The average expenditure per buying family was also highest among the large-city families for each product except frozen concentrated orange juice. For most products the lowest average expenditure was made by the families living in cities of under 100,000.

38/ All of the 500 panel families were classified according to the size of city in which they live. Metropolitan areas rather than corporate city limits were used in defining the 17 largest cities. The metropolitan area was defined as the corporate city and the contiguous counties. The metropolitan population of these areas was defined as the total population, excluding the farm population of the included counties.

39/ This highest expenditure group did include some families from the Pacific States, a region of low average citrus expenditures, but only 19 percent of all families living in metropolitan areas of over a million population were from this region. More than half of these families lived in the Northeast.

40/ For purposes of analyzing, the two middle city-size classifications were combined in one group in table 21. These three city-size classifications then included about the same number of families, with 152 families living in cities from 100,000 up to a million population, 169 families in metropolitan areas of over 1 million population, and 179 families in cities of population 10,000 up to 100,000.

The average per family expenditure for frozen concentrated orange juice among the large-city families was \$1.69, compared with 99 cents for families in cities of under 100,000 population and \$1.57 among families in the 100,000 to 1 million city population range. The percentage increase from the small-city to the large-city families was greater for this product than any other citrus product. It should be noted that large-scale distribution of frozen concentrated orange juice first began in the larger metropolitan areas in the Northeast.

Average expenditures for canned noncitrus juices were much higher among the large-city families. The families living in metropolitan areas of over a million population spent an average of \$7.49 on these noncitrus juices, compared with an average of \$4.90 by families in the next city-size classification and \$4.42 by families in cities of under 100,000 population.

CONSUMER RESPONSE TO INTRASEASONAL PRICE CHANGES

One of the specific objectives of this study was an analysis of consumer reaction to intraseasonal price changes of various citrus products and other canned juices, and to relate the effect of these price changes to income groups and to shifts in purchases from citrus to noncitrus canned juices. To obtain more positive conclusions, however, the analysis should be based on a period longer than the 1 year covered in these data.

Shifts in Purchases of Canned Juices

Many of the noncitrus juices are generally considered as direct substitutes for canned citrus juices. Purchases of canned tomato juice and pineapple juice were tabulated separately in this study while all other canned juices were grouped together. The most important juices in this "other canned juices" category were prune, apple, grape, and vegetable cocktail.

During the 1-year period, the proportion of families in this sample that bought some of the noncitrus juices was larger than the proportion that bought any of the canned citrus juices. About 70 percent bought tomato juice and 61 percent bought pineapple juice, compared with 58 percent for canned single-strength orange juice -- the largest proportion for any of the citrus juices. About 91 percent of all sample families made at least one purchase of canned noncitrus juices during the 1-year period, compared with 85 percent for canned single-strength citrus juices.

Purchases of canned noncitrus juices by these sample families during the 1-year period totaled 828 cases (equivalent No. 2 cans), compared with 736 cases of canned single-strength citrus juices (table 11). ^{41/} During the first half of the period, citrus juice purchases were slightly higher than all other canned juice purchases, but were considerably lower during the second half.

^{41/} Purchases of citrus juices were slightly higher if the purchases of frozen concentrated orange juice on an equivalent volume basis (150 cases) are added to the volume of single-strength citrus juices.

Table 11.- Canned juices: Volume of purchases by 500 sample families,
November 1948-October 1949

Product	Nov. 1948- Apr. 1949	May- Oct. 1949	Total
	Cases <u>1/</u>	Cases <u>1/</u>	Cases <u>1/</u>
Citrus juices			
Orange	180	122	302
Grapefruit	110	102	212
Orange-grapefruit blend ..	103	76	179
Other	<u>2/</u>	<u>2/</u>	43
Total	<u>2/</u>	<u>2/</u>	736
Other canned juices			
Tomato	174	189	363
Pineapple	95	69	164
All other	132	159	301
Total	401	417	828

1/ Cases of equivalent No. 2 cans, 432 ounces per case.

2/ Not ascertained.

Purchases of tomato juice were larger than those of any other juice -- about 20 percent higher than total orange juice purchases and almost equal to the combined purchases of grapefruit and blended orange-grapefruit juice. During the first half of the 1-year period, however, total purchases of orange juice were slightly higher than those of tomato juice. But during the second half of the year purchases of orange juice declined considerably whereas tomato juice purchases were slightly higher. Thus, tomato juice purchases in the second half were more than 50 percent higher than those of orange juice.

These shifts in volume of purchases of these canned juices were related to price changes that took place during the 1-year period. The average price paid for tomato juice remained almost constant throughout the year at an average of about 27 cents per equivalent 46-ounce can. 42/ The average price paid for canned orange juice, however, increased from 25.6 cents per equivalent 46-ounce can in the first quarter (Nov. 1948-Jan. 1949) to 41.1 cents in the fourth quarter (Aug.-Oct. 1949). The average price paid per equivalent 46-ounce can for grapefruit juice rose from 20.6 in the first quarter to 30.3 cents in the fourth quarter, and blended juice from 23.0 to 40.3 cents. At the same time, purchases of these citrus juices declined by comparable amounts from the first to the fourth quarter -- orange juice from 90.0 to 56.1 cases, grapefruit from 60.1 to 45.0 cases, and orange-grapefruit blend from 52.6 to 29.2 cases.

A quantitative measurement of the price and volume shifts between these two periods indicated that price increases in orange juice and orange-grapefruit blend were accompanied by equal relative declines in purchases.

42/ The average price per equivalent 46-ounce can was computed from the average price per ounce of all juice bought, which was slightly higher than the average price of juice bought in 46-ounce cans. The largest share of the volume was bought in 46-ounce cans, but the juice sold in smaller size cans sold at a higher average price per ounce.

The decline in grapefruit juice purchases was proportionately less than the price rise. 43/

The responsiveness of total consumer purchases to price increases in canned citrus juices has been described in previous paragraphs. Several questions pertain to these price-volume relationships.

Did the reduction in consumer purchases result principally from declines in proportion of families buying or from smaller purchases per buying family? Did these buying families shift to other citrus juices or to noncitrus juices or to both? Was consumer response to price changes greatest among particular income groups or other family characteristic "groups"? To answer these questions, a detailed study was made of the purchase records of families buying canned single-strength orange juice.

Over the 12-month period, large declines were noted in both number of families buying canned orange juice and average volume of purchases, although these figures fluctuated considerably between months. Both of these factors probably contributed about equally to the decrease in total volume of purchases.

The response of individual families to these price increases followed no established pattern. A total of 292 families bought canned orange juice during the 1-year period. About 20 percent of these families (57) made purchases only during the second half -- the period of higher prices. A slightly larger number (72) bought only during the first half while 163 families bought during both of these 6-month periods. Purchases by these 163 families, however, accounted for almost 90 percent of the total purchases.

A relatively small number of families accounted for most of the decline in purchases of canned single-strength orange juice throughout the period. Fifty-four families -- slightly over 10 percent of the total sample -- bought an average of almost 1 case (equivalent No. 2 cans, 432 ounces) during each of the first two quarters. 44/ Average purchases by these 54 families dropped to 1/3 case in the third quarter and 1/5 case in the fourth quarter.

43/ The ratio of relative quantity and price changes equaled -1.00 for canned orange juice, -1.05 for blended juice and -0.75 for canned grapefruit juice. These figures were computed from the following elasticity formula:

$$\frac{Q_a - Q_b}{Q_a + Q_b} \div \frac{P_a - P_b}{P_a + P_b}$$
 where Q_a = volume of purchases in the first quarter, Q_b = volume of purchases in the fourth quarter, P_a = average price paid in the first quarter and P_b = average price paid in the fourth quarter. These figures cannot be interpreted as actual measurements of the price elasticity of demand unless it is assumed that both of these points are on the aggregate demand curve of urban consumers for these products. A statistical demand curve could not be constructed from the available data. Also, the elasticity computation should be obtained from 2 points relatively close together on the demand curve.

44/ These 54 families were selected because their purchase records indicated relatively large purchases in the first two quarters, followed by sharp declines in later quarters.

Purchases of other canned juices by these 54 families were tabulated for the two 6-month periods. These families increased their total purchases of other juices (including frozen concentrated orange juice on an equivalent volume basis) from 100 cases in the first half of the year to 121 cases in the second half, a gain of 21 cases. At the same time, their purchases of canned orange juice declined 71 cases, from 101 in the first half to 30 in the second half.

Most of this increased volume of purchases of other juices during the second half by these 54 families resulted from larger purchases of frozen concentrated orange juice. But this increase was only slightly larger than the average for all other families.

The 54 families bought slightly more canned grapefruit and blended orange-grapefruit juice in the second 6-month period in contrast to a substantial decline in total purchases of these juices by all other families. It should be noted that some other families bought a substantially larger volume of orange juice during the second half of the period while their purchases of these other citrus juices declined. Substitution between these citrus juices may have been influenced by relative changes in price. Because of preferences in taste, some families may have been willing to pay higher prices for one of the citrus juices than any other. This apparent substitution between these juices also may have been related to quality variations as well as availability of the different juices at various periods.

Shifts in purchases of tomato juice and "other canned juices" between the two 6-month periods were similar for both the group of 54 families and all other families. Purchases of pineapple juice by the 54 families declined 10 percent in the second 6-month period, compared with a decline of over 30 percent for all other families. In summary, there was no apparent shift to noncitrus canned juice by these families whose purchases of canned orange juice declined sharply during the period of rising prices for orange juice.

The decline in purchases of canned orange juice could not be attributed to any specific income group or other family characteristic groups.

Response to Price Changes by Income Groups

Variations in average monthly purchases of all of the citrus products and other canned juices in relation to prices were tabulated by income groups. With the exception of California oranges, the response to price change was no greater among the lowest income groups than the higher income groups. Monthly variations in expenditures on California oranges were inversely correlated with monthly price changes. Among families with incomes of under \$3,000, the coefficient of determination (r^2) equaled 0.90, compared with a range of 0.42 to 0.19 for all other family income groups. ^{45/}

^{45/} The significance of the correlation coefficients was determined by the "t" test, which indicated that "r" was significantly greater than 0 only for the lowest family income group.

California oranges are a relatively high priced citrus product, which may partly account for the greater response to price changes among the lower income families. California oranges are marketed throughout the year, whereas Florida oranges, grapefruit, and lemons all have peak marketing seasons of 6 to 8 months during each season. To adjust for the seasonality of these other fresh fruits, it would be necessary to extend the period over several years.

Short-run price analysis for the canned juices requires a larger sample of families. Although from 250 to 350 families bought the various canned juices over a 1-year period, the number buying in any 1 month was usually not more than 100 families. Each income group, therefore, contained relatively few buying families in a single month. The extreme variability in purchases between families, the concentration of purchases among a few families, and the infrequency of purchases by many families all contributed to the very erratic monthly volume series by income groups.

APPENDIX

Information on Sample Families

Information received from Industrial Surveys Company on place of residence and other characteristics for each family in 500-family sample:

Total family income - shown in whole dollars (00,000 - \$99,999)

Formula income - shown in whole dollars (0,000 - \$9,999)

Based on Industrial Surveys Company formula which adjusts total family income for both number of members dependent upon that income, and number of wage earners contributing to that income:

$$\frac{(W + M) T}{2W \cdot M}$$

W = Number of wage earners

M = Number of family members

T = Total family income

Family size - total number of people within the household

Presence of children - by age groups

No children

5 years or under

6 through 12 years

13 through 20 years

5 and under; 6 through 12

5 and under; 13 through 20

6 through 12; 13 through 20

5 and under; 6 through 12; 13 through 20

(Each family was classified in only one child group.

If there were children in more than one of the three age groups, that family was listed in one of the multiple age group classifications.)

Age of family head - by age groups:

- Under 25
- 25 - 29
- 30 - 34
- 35 - 39
- 40 - 44
- 45 - 49
- 50 and over

Education of family head

- Grammar school
- Some high school
- Some college

Occupation of family head

- Professional and executive
- Clerical and sales
- Wage earner (laborer)
- Farmer
- Unclassifiable

Residence - metropolitan city size (population)

- 10,000 - 99,999
- 100,000 - 299,999
- 300,000 - 999,999
- 1,000,000 and over

Residence - geographic region

Northeast -

(Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia)

South -

(Virginia, West Virginia, Georgia, Florida, North Carolina, South Carolina, Kentucky, Tennessee, Mississippi, Alabama, Arkansas, Louisiana)

North Central -

(Michigan, Ohio, Indiana, Illinois, Minnesota, Wisconsin, North Dakota, South Dakota, Nebraska, Iowa, Kansas, Missouri)

Mountain-Southwest -

(Oklahoma, Texas, Idaho, Montana, Wyoming, Utah, Colorado, Nevada, Arizona, New Mexico)

Pacific -

(Washington, Oregon, California)

Table 12.- Fresh citrus fruits and canned juices: Average volume of purchases by family income groups for 500 sample families, November 1948-October 1949 ^{1/}

Per family ^{2/}

Family income (dollars)	Fresh			Frozen: concentrated: orange juice - 6-ounce cans		Canned single-strength juice - 46-ounce cans			
	Oranges	Grape- fruit	Lemons	Orange	Grape- fruit	Blended	Pine- apple	Tomato	
	Dozens	Dozens	Dozens	Number	Number	Number	Number	Number	Number
Under 2,000 ..	8.9	1.8	2.4	2.0	3.3	2.9	1.5	1.6	4.6
2,000 - 2,999:	18.4	2.3	2.7	3.6	6.2	3.4	3.0	2.6	4.3
3,000 - 3,999:	23.6	2.4	2.9	5.2	6.2	3.1	3.5	2.9	6.8
4,000 - 4,999:	19.3	3.1	4.3	5.3	5.9	5.7	4.2	4.9	8.3
5,000 - 6,999:	24.3	3.4	3.2	6.2	4.7	3.6	2.6	2.1	8.0
7,000 and over:	23.4	3.9	3.7	11.1	6.9	5.7	5.1	3.7	7.5
Average	20.6	2.8	3.2	5.4	5.7	4.0	3.4	3.1	6.8

Per buying family

Under 2,000 ..	11.3	2.6	3.8	6.7	6.1	5.2	3.9	3.6	6.7
2,000 - 2,999:	20.0	3.2	3.5	8.5	9.4	6.8	6.4	4.2	7.0
3,000 - 3,999:	24.1	3.1	3.4	13.5	10.4	6.4	7.1	4.5	9.8
4,000 - 4,999:	21.5	3.7	5.1	11.1	9.6	9.8	7.9	7.8	12.1
5,000 - 6,999:	26.1	4.1	3.6	12.8	9.3	7.0	6.6	3.5	11.2
7,000 and over:	25.5	4.4	4.3	18.4	12.7	10.5	11.1	6.4	9.2
Average	22.4	3.5	3.9	12.3	9.7	7.6	7.2	5.1	9.8

^{1/} The volumes of all canned single-strength juice were converted into number of equivalent 46-ounce cans.

^{2/} Based on total number of families in each income group.

Table 13.- Fresh citrus fruits and canned juices: Average expenditure by family income groups for 500 sample families, November 1948-October 1949

Family income (dollars)	Per family 1/								
	Fresh			Frozen concentrated	Canned single-strength juice				
	Oranges:	Grape- fruit	Lemons:	orange juice	Orange:	Grape- fruit	Blended:	Pine- apple:	Tomato
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Under 2,000 ..:	2.84	1.48	.95	.51	1.00	.63	.44	.67	1.23
2,000 - 2,999 :	6.22	2.00	1.15	.90	1.94	.85	.89	1.10	1.16
3,000 - 3,999 :	8.75	1.99	1.36	1.38	1.92	.78	1.03	1.22	1.88
4,000 - 4,999 :	7.16	2.55	2.03	1.39	1.80	1.41	1.19	2.05	2.28
5,000 - 6,999 :	8.80	2.79	1.55	1.66	1.58	.92	.80	.88	2.16
7,000 and over:	8.51	3.13	1.59	3.04	2.10	1.44	1.41	1.60	2.02
Average	7.46	2.30	1.48	1.43	1.77	.99	.98	1.29	1.85
Per buying family									
Under 2,000 ..:	3.58	2.09	1.47	1.76	1.85	1.13	1.17	1.52	1.79
2,000 - 2,999 :	6.75	2.77	1.49	2.13	2.96	1.70	1.88	1.77	1.87
3,000 - 3,999 :	8.94	2.58	1.61	3.57	3.23	1.60	2.08	1.90	2.68
4,000 - 4,999 :	7.95	3.07	2.39	2.89	2.90	2.44	2.24	3.25	3.30
5,000 - 6,999 :	9.44	3.41	1.75	3.40	3.08	1.76	2.01	1.44	3.00
7,000 and over:	9.29	3.57	1.86	5.02	3.87	2.66	3.08	2.74	2.49
Average	8.10	2.92	1.79	3.26	3.02	1.88	2.10	2.13	2.65

1/ Based on total number of families in each income group.

Table 14.- Fresh citrus fruits and canned juices: Proportion of all families buying by family income groups for 500 sample families, November 1948-October 1949

Family income (dollars)	Fresh			Frozen: concen- trated	Canned single-strength juice				
	Oranges:	Grape- fruit	Lemons	orange juice	Orange:	Grape- fruit	Blended:	Pine- apple	Tomato
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Under 2,000 ..	79	71	65	29	54	56	38	44	69
2,000 - 2,999 :	92	72	78	42	66	50	47	62	62
3,000 - 3,999 :	98	77	85	39	59	49	49	64	70
4,000 - 4,999 :	90	83	85	48	62	58	53	63	69
5,000 - 6,999 :	93	82	89	49	51	52	40	61	72
7,000 and over:	92	88	85	60	54	54	46	58	81
Average	92	79	83	44	58	53	47	61	70

Table 15.- Fresh citrus fruits and canned juices: Average price paid by family income groups for 500 sample families, November 1948-October 1949

Family income (dollars)	Fresh- dozens			Frozen: concen- trated	Canned single-strength juice- 46-ounce cans 1/				
	Oranges:	Grape- fruit	Lemons	juice - 6-ounce cans	Orange:	Grape- fruit	Blended:	Pine- apple	Tomato
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Under 2,000 ..	31.8	80.4	39.1	26.2	30.2	21.6	29.9	42.6	26.8
2,000 - 2,999 :	33.7	86.4	42.4	25.0	31.3	25.1	29.3	41.7	26.9
3,000 - 3,999 :	37.0	82.2	47.9	26.5	31.1	25.1	29.4	42.1	27.5
4,000 - 4,999 :	37.1	82.2	47.0	26.2	30.3	25.0	28.4	41.6	27.3
5,000 - 6,999 :	36.2	82.2	48.7	26.6	33.2	25.3	30.6	41.5	26.8
7,000 and over:	36.5	81.2	43.2	27.4	30.5	25.3	27.8	43.1	27.0
Average	36.1	82.4	46.0	26.5	31.2	24.9	29.1	42.0	27.1

1/ The prices paid for the canned single-strength juices were converted to average prices per equivalent 46-ounce can by multiplying the average price per ounce for the total volume of purchases by 46.

Table 16.- Fresh citrus fruits and canned juices: Average per capita expenditure by per capita income groups for 500 sample families, November 1948-October 1949

Per capita income (dollars)	Fresh			Frozen concentrated		Canned single-strength juice			
	Oranges	Grape-fruit	Lemons	orange juice	Orange	Grape-fruit	Blended	Pine-apple	Tomato
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Under 600	1.60	.54	.33	.13	.34	.26	.14	.31	.35
600 - 899	2.17	.46	.33	.21	.63	.23	.38	.36	.46
900 - 1,199 ..	2.09	.55	.38	.44	.59	.22	.20	.34	.49
1,200 - 1,799 :	2.12	.82	.49	.54	.54	.33	.39	.33	.69
1,800 - 2,399 :	2.26	.92	.57	.50	.44	.61	.21	.36	.73
2,400 and over:	3.09	1.31	.83	1.17	.23	.59	.18	.87	.68
Average	2.19	.68	.44	.42	.52	.29	.29	.38	.54

Table 17.- Fresh citrus fruits and canned juices: Proportion of families buying and average expenditure according to presence of children in family for 500 sample families, November 1948-October 1949

Proportion of families buying									
Presence of children in family	Fresh			Frozen concentrated		Canned single-strength juice			
	Oranges	Grape-fruit	Lemons	orange juice	Orange	Grape-fruit	Blended	Pine-apple	Tomato
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Children	95	79	84	46	65	49	52	62	72
No children ..	88	78	80	41	49	57	39	59	67
Expenditure per family									
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Children	8.72	2.35	1.41	1.59	2.29	1.03	1.18	1.38	2.03
No children ..	5.71	2.24	1.58	1.21	1.04	.93	.70	1.17	1.60
Expenditure per capita									
Children	2.05	.55	.33	.37	.54	.24	.28	.32	.48
No children ..	2.56	1.00	.71	.54	.46	.42	.32	.52	.72

Table 18.- Fresh citrus fruits and canned juices: Proportion of families buying, by size of family for 500 sample families, November 1948-October 1949

Size of family (number)	Fresh			Frozen concentrated		Canned single-strength juice			
	Oranges	Grape- fruit	Lemons	orange juice	Orange	Grape- fruit	Blended	Pine- apple	Tomato
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1 - 2	82	78	80	41	49	65	44	59	66
3	93	76	81	47	54	44	38	61	63
4	94	80	86	45	68	51	55	61	75
5	94	82	89	48	67	44	54	67	83
6 - 9	98	83	78	37	63	54	49	54	71
Average ...	92	79	83	44	58	53	47	61	70

Table 19.- Fresh citrus fruits and canned juices: Average expenditure by size of family for 500 sample families, November 1948-October 1949

Size of family (number)	Per family								
	Fresh			Frozen concentrated		Canned single-strength juice			
	Oranges	Grape- fruit	Lemons	orange juice	Orange	Grape- fruit	Blended	Pine- apple	Tomato
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1 - 2	4.85	1.96	1.34	.93	1.10	.93	.55	1.12	1.30
3	6.56	2.24	1.48	2.00	1.06	.68	.69	1.25	1.73
4	9.50	2.74	1.67	1.87	2.42	1.09	1.18	1.42	2.30
5	9.75	2.57	1.32	1.01	3.12	.93	2.41	1.54	2.87
6 - 9	10.54	2.07	1.63	.68	2.62	1.94	.96	1.29	1.49
Average ...	7.46	2.30	1.48	1.43	1.77	.99	.98	1.29	1.85

	Per capita								
1 - 2	2.74	1.11	.76	.52	.62	.53	.31	.64	.74
3	2.19	.75	.49	.67	.35	.23	.23	.42	.58
4	2.37	.69	.42	.47	.61	.27	.30	.36	.57
5	1.95	.52	.26	.20	.62	.19	.48	.31	.57
6 - 9	1.57	.31	.24	.10	.39	.29	.14	.19	.22
Average ...	2.19	.68	.44	.42	.52	.29	.29	.38	.54

Table 20.- Fresh citrus fruits and canned juices: Proportion of families buying and average expenditure by geographic region for 500 sample families, November 1948-October 1949

Region	Proportion of families buying								
	Fresh			Frozen	Canned single-strength juice				
				concentrated					
	Oranges:	Grape-:	Lemons:	orange:	Orange:	Grape-:	Blended:	Pine-:	Tomato
	fruit	fruit		juice		fruit		apple	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Northeast	97	84	84	58	56	53	52	70	78
North Central :	93	74	82	44	63	51	45	51	60
Other 1/	85	77	80	25	57	54	41	59	69
Average	92	79	83	44	58	53	47	61	70
	Expenditure per family 2/								
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Northeast	9.52	2.93	1.37	2.31	1.87	1.23	1.50	1.90	2.34
North Central :	7.35	2.01	1.46	1.09	1.48	.75	.72	.90	1.33
Other 1/	4.75	1.78	1.66	.62	1.95	.94	.56	.90	1.79
Average	7.46	2.30	1.48	1.43	1.77	.99	.98	1.29	1.85
	Expenditure per buying family								
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Northeast	9.82	3.47	1.62	4.01	3.37	2.32	2.88	2.71	2.98
North Central :	7.93	2.74	1.78	2.48	2.37	1.47	1.62	1.77	2.21
Other 1/	5.58	2.31	2.07	2.48	3.41	1.75	1.34	1.54	2.58
Average	8.10	2.92	1.79	3.26	3.02	1.88	2.10	2.13	2.65

1/ Includes South, Mountain-Southwest and Pacific regions.

2/ Based on total number of families in each region.

Table 21.- Fresh citrus fruits and canned juices: Proportion of families buying and average expenditure by size-of-city residence for 500 sample families, November 1948-October 1949

Size of city (population)	Proportion of families buying								
	Fresh			Frozen	Canned single-strength juice				
				concentrated					
	Oranges	Grapefruit	Lemons	orange juice	Orange	Grapefruit	Blended	Pineapple	Tomato
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
10,000-99,999	91	75	85	43	64	51	44	57	60
100,000-999,999	93	79	82	38	56	48	41	60	67
1,000,000 and over	92	82	82	51	56	59	55	64	82
Average	92	79	83	44	58	53	47	61	70
	Expenditure per family 1/								
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
10,000-99,999	6.32	1.79	1.42	.99	1.50	.85	1.01	1.17	1.60
100,000-999,999	7.24	2.38	1.45	1.57	1.48	.84	.63	.98	1.66
1,000,000 and over	8.73	2.69	1.58	1.69	2.31	1.27	1.32	1.74	2.27
Average	7.46	2.30	1.48	1.43	1.77	.99	.98	1.29	1.85
	Expenditure per buying family								
10,000-99,999	6.96	2.39	1.67	2.28	2.35	1.66	2.30	2.04	2.67
100,000-999,999	7.76	3.02	1.77	4.12	2.65	1.75	1.54	1.62	2.48
1,000,000 and over	9.46	3.27	1.93	3.33	4.11	2.17	2.39	2.72	2.78
Average	8.10	2.92	1.79	3.26	3.02	1.88	2.10	2.13	2.65

1/ Based on total number of families in each region.

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